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Technical Memorandum 4183

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Technical Memorandum 90-B-004

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JUNE 1990

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Jeffrey D. Singleton, William T. Yeager, Jr.,
and Matthew L. Wilbur
Aerostructures Directorate
USAARTA-AVSCOM
Langley Research Center
Hampton, Virginia

National Aeronautics and
Space Administration
Office of Management
Scientific and Technical
Information Division

1990

Summary

An investigation was conducted in the Langley Transonic Dynamics Tunnel to evaluate an advanced main rotor designed for use on a utility-class helicopter, specifically the U.S. Army UH-60A Black Hawk. This rotor design incorporated advanced twist, airfoil cross sections, and geometric planform. For evaluation purposes, the current UH-60A main rotor was also tested and is referred to as the baseline blade set. A total of four blade sets were tested. One blade set of the baseline rotor and one of the advanced rotor were dynamically scaled to represent a full-scale helicopter rotor-blade design. The remaining advanced and baseline blade sets were not dynamically scaled so that the effects of structural elasticity could be isolated and studied. The investigation was conducted in hover and at rotor advance ratios ranging from 0.15 to 0.4 at a range of nominal test-medium densities from 0.00238 to 0.009 slug/ft^3. This range of densities, coupled with varying rotor lift and propulsive force, allowed for the simulation of several combinations of vehicle gross weight and density altitude. Performance data are presented for all blade sets without analysis; however, cross-referencing of data with flight condition may be useful to the analyst for validating aeroelastic theories and design methodologies as well as for evaluating advanced-design parameters.

Introduction

The rotorcraft industry is currently undergoing a period of rapid technology development. As the technology becomes increasingly complex, the need arises for augmenting the design phase of rotor system development with complementary wind-tunnel testing and analysis. In the past, the testing of scale models has not played as great a role to the helicopter industry as it has to the fixed-wing industry (ref. 1). However, the complicated designs of hingeless and bearingless rotors as well as advances in blade airfoils, geometry, and twist distribution have provided the impetus for addressing the problems of rotor performance, loads, vibration, and stability during the early stage of rotor development. One method of addressing these problems is the evaluation of new rotor systems through the use of scale-model rotors. One such evaluation concerned a comparison of the current rotor of the U.S. Army UH-60A Black Hawk helicopter as a baseline rotor with an advanced-design rotor (ref. 2). A thorough compilation of the performance data from that evaluation is contained herein. The advanced-design rotor incorporated advanced airfoils, geometry, and twist distribution and was designed using the approach of reference 3. The analyses employed for the aforementioned evaluation combined momentum theory and blade-element theory (ref. 4) for the hover conditions and the computer program of reference 5 for the forward flight conditions. All testing was conducted in the Langley Transonic Dynamics Tunnel (TDT) using 1/6-scale models both in hover and forward flight up to an advance ratio of 0.4. The test specimens included two sets of geometrically scaled rotors and two sets of dynamically scaled rotors. Model lift and drag were varied to simulate changes in vehicle gross weight, propulsive force, and density altitude.

Symbols

The positive directions of forces, moments, angles, and velocities are shown in figure 1.

A	balance axial force, lb
A_1	rotor first-harmonic lateral cyclic pitch angle, deg
a	speed of sound, ft/sec
a_0	airfoil-section lift-curve slope, per radian
B_1	rotor first-harmonic longitudinal cyclic pitch angle, deg
C_D	rotor drag coefficient, $D/\rho\pi R^2(\Omega R)^2$
C_L	rotor lift coefficient, $L/\rho\pi R^2(\Omega R)^2$
C_Q	rotor torque coefficient, $Q/\rho\pi R^3(\Omega R)^2$
C_T	rotor thrust coefficient, $T/\rho\pi R^2(\Omega R)^2$
c	nominal blade chord, ft
D	rotor drag, $N \sin \alpha_s + A \cos \alpha_s$, lb
d	rotor diameter, ft
f_D	equivalent parasite area, ft^2
I_b	blade mass moment of inertia about flapping hinge, slug-ft^2
I_θ	blade torsional mass moment of inertia about elastic axis, lb-sec^2/ft
L	rotor lift, $N \cos \alpha_s - A \sin \alpha_s$, lb
M_T	rotor-tip Mach number in hover, $\Omega R/a$
$M_{1,90}$	tip Mach number at $r/R = 1.0$ and 90° azimuth
N	balance normal force, lb
Q	rotor-shaft torque, ft-lb
R	rotor radius, ft
r	spanwise distance along blade radius from center of rotation, ft

S	balance side force, lb
T	rotor thrust, lb
V	free-stream velocity, ft/sec
z	distance from wind-tunnel floor to rotor plane of rotation, ft
α_s	rotor-shaft angle of attack, deg
γ	rotor-blade Lock number, $\rho a_0 c R^4 / I_b$
θ	rotor-blade collective pitch angle at $r/R = 0.75$, deg
θ_1	twist angle built into rotor blade, positive nose up, deg
μ	rotor advance ratio, $(V \cos \alpha_s)/\Omega R$
ρ	test-medium mass density, slug/ft^3
Ψ	rotor-blade azimuth angle, deg
Ω	rotor rotational velocity, rad/sec
ω	natural frequency of rotating blade mode, rad/sec

Apparatus and Procedures

Wind Tunnel

The investigation was conducted in the Langley Transonic Dynamics Tunnel (TDT). A schematic of the TDT is shown in figure 2. The TDT is a continuous-flow tunnel with a slotted test section capable of operation up to a Mach number of 1.2 at stagnation pressures of 0.1 to 1.0 atmosphere. The tunnel test section is 16 ft square with cropped corners and has a cross-sectional area of 248 ft^2. Either air or refrigerant-12 (R-12) may be used as the test medium. For this investigation, R-12 was used as the test medium at a range of densities from 0.00382 to 0.009 slug/ft^3. Air at atmospheric pressure (with a density of 0.00238 slug/ft^3) was also used as the test medium for some hover conditions. Because of its high density at normal atmospheric pressure and its low speed of sound, the use of R-12 aids the matching of model-rotor-scale Mach number to full-scale values and provides Reynolds numbers greater than those obtainable using air. Furthermore, some restrictions on model structural design parameters are eased while maintaining dynamic similarity. The heavier test medium permits a simplified structural design to obtain the required stiffness characteristics, and thus eases design and fabrication requirements of the model (ref. 6).

Model Description

The model rotor hub used in this investigation was a four-bladed articulated hub with coincident lead-lag and flapping hinges. The hub was operated with a pitch-flap coupling ratio of 0.5 (flap up, pitch down). The attachment point of the blade pitch link was 1.4 in. aft of the blade pitch axis. Four sets of blades were used during these tests: (1) a baseline stiff blade set, (2) an advanced-design stiff blade set, (3) a baseline dynamically scaled, or elastic, blade set, and (4) an advanced-design elastic blade set. The structural properties and rotating natural frequencies of the stiff blade sets are presented in tables 1 and 2, whereas those of the elastic blade sets are presented in tables 3 and 4. The rotating natural frequencies were calculated using the Comprehensive Analytical Model of Rotorcraft Aerodynamics and Dynamics (CAMRAD) analysis described in references 7 and 8. The dynamic characteristics of the stiff blade sets do not represent actual helicopter blades in terms of flapwise (out-of-plane), chordwise (in-plane), or torsional stiffness and were included in the investigation solely to isolate the effects of structural elasticity. The dynamic characteristics of the baseline elastic blades are representative of the current main rotor of the UH-60A helicopter. The dynamic properties of the advanced-design elastic blades are representative of a full-scale helicopter design, should such blades be built.

The baseline blade sets were 1/6-size, Mach-number-scaled representations of rotor blades in use on the U.S. Army UH-60A utility-class helicopter. These blades were untapered with a 20° swept tip with sweep initiating at the 94-percent-radius station. The baseline blades used SC1095 and SC1095-R8 airfoils. Aerodynamic characteristics of these airfoils are documented in reference 9. The area, thrust-weighted, and torque-weighted solidities for the baseline rotor were all 0.0825. The planform geometry and twist distribution of these blades are shown in figure 3. One blade of each baseline blade set was instrumented with resistance-wire strain gauge bridges calibrated to measure blade structural moments. These gauges were used to monitor the load limits for safety considerations. Embedded in each baseline stiff blade were four hollow steel tubes extending along the leading and trailing edges of the blade spar centered about the quarter-chord. These tubes allowed for distributed nonstructural mass to be added to the blades from the blade root to the 80-percent-radius station. Steel or tungsten rods were inserted into these tubes to ballast the blade to match the Lock number for the tunnel test-medium operating density.

The advanced sets of model rotor blades were also 1/6-size and Mach-number-scaled and had a 3:1 taper ratio with taper initiating at the 80-percent-radius station and extending to the tip. The advanced blade sets utilized RC(4)-10, RC(3)-10, and RC(3)-08 airfoils. Aerodynamic characteristics of the RC(3)-08 and RC(3)-10 airfoils are documented in reference 10. The aerodynamic characteristics of the RC(4)-10 airfoil have been obtained but have not been reported on at this time. The area, thrust-weighted, and torque-weighted solidities for the advanced rotor were 0.114, 0.101, and 0.0956, respectively. The advanced blade geometric planform and twist distribution are shown in figure 4. The advanced blade sets were also instrumented with resistance-wire strain gauge bridges to monitor the blade bending moments. Each advanced stiff blade had two hollow steel tubes centered about the quarter-chord and extending along the spar from the root to the 80-percent-radius station. Steel or tungsten weights could be inserted into the tubes to ballast the blades for the tunnel operating density and match the Lock number. Each blade of the advanced elastic blade set was equipped with a magnesium weight block centered radially at the 60-percent-radius station. The purpose of this weight block was to permit the addition of nonstructural mass for reasons of vibration-reduction research. From three to seven nonstructural masses could be added, with each mass averaging 0.054 lb.

All sets of blades were tested using the aeroelastic rotor experimental system (ARES) model shown in figures 5 and 6. The ARES has a streamlined fuselage enclosing the rotor controls and drive system. The ARES is powered by a variable-frequency synchronous motor rated at 47-hp output at 12 000 rpm. The motor is connected to the rotor shaft through a belt-driven two-stage speed reduction system. The ARES rotor control system and rotor-shaft angle of attack are remotely controlled from the wind-tunnel control room. The model rotor-shaft angle of attack is varied by an electrically controlled hydraulic actuator. Blade collective pitch and lateral and longitudinal cyclic pitch are input to the rotor shaft through a swashplate. The swashplate is moved by three hydraulic actuators.

Instrumentation on the ARES allows continuous displays of model rotor control settings, rotor moments and forces, blade structural moments, and pitch-link loads. The ARES rotor-shaft pitch attitude is measured by a static accelerometer, and rotor control positions are measured by linear potentiometers connected to the swashplate. Rotor-blade flapping and lagging are measured by rotary potentiometers mounted on the rotor hub and geared to the rotor cuff. Rotor-shaft speed is determined by a magnetic sensor. The rotating-blade data are transferred through a 30-channel slip-ring assembly. Rotor forces and moments are measured by a six-component strain gauge balance mounted below the rotor pylon and drive system. The balance is fixed with respect to the rotor shaft and pitches with the fuselage. Fuselage forces and moments are not sensed by the balance.

Test Procedure and Data Reduction

The purpose of this investigation was to compare the performance characteristics of a baseline and an advanced rotor system, and to examine the effects of Mach number, Lock number, Reynolds number, and dynamic scaling; therefore, all blade sets were evaluated at the same nominal test conditions defined by f_D, M_T, C_L, and C_D. Values of M_T, C_L, and C_D were varied to simulate density altitude, vehicle gross weight, and propulsive force defined by f_D. Tables 5 and 6 outline the test conditions ρ, I_b, M_T, and γ for the stiff and elastic blade sets, respectively. Each blade set was ballasted for a specified test-medium density as indicated in tables 5 and 6. Variations in Reynolds number and Lock number were then achieved by varying the tunnel operating density. For test points concerning vibration reduction, three, five, or seven nonstructural masses were added to each advanced elastic blade centered at the 60-percent-radius station. At each test point, the rotor rotational speed and tunnel conditions were adjusted to give the desired values of tip Mach number and advance ratio. The model was then pitched to give the desired shaft angle of attack. Blade collective pitch was changed to obtain variations in rotor lift and propulsive force. At each collective pitch setting, the cyclic pitch was used to remove rotor first-harmonic flapping with respect to the rotor shaft. Data were then recorded at each value of collective pitch. The maximum value of collective pitch attained at each shaft angle of attack was determined in most cases by either the blade load limits or the ARES drive-system limits. Rotor aerodynamic performance and blade loads were measured in hover and in forward flight at advance ratios ranging from 0.15 to 0.4 for a range of α_s from 0° to −11.8°.

Model deadweight tares were determined throughout the range of shaft angles of attack with the blades on and with them removed. Aerodynamic rotor hub tares were determined with the blades removed throughout the ranges of shaft angle of attack and advance ratios investigated. Both deadweight and aerodynamic hub tares have been removed from the data presented herein. All data were acquired at z/d equal to 0.87. For hover cases, the test-section floor and model were lowered approximately 3 ft,

thus maintaining a value of z/d of 0.87. The resulting gap along the lower sidewalls of the test section opened into a plenum surrounding the slotted test section. Coupled with the test-section slots, this served to minimize rotor wake recirculation in hover. No correction has been applied to the data to account for tunnel wall effects; however, for the flight conditions tested, these effects have been shown to be small (ref. 11). Prior to each test run, all strain gauge and balance voltage readings were zeroed with the blades resting on the down stops and not rotating. At each test point, tunnel parameter data were averaged and stored digitally. Performance data, i.e., fixed-system forces and moments, were averaged and stored as digital counts. At the completion of each run, all strain gauge and balance voltage readings were again recorded with the blades resting on the down stops and not rotating. These final voltage readings were used to correct for any amplifier voltage drift.

Presentation of Data

The rotor performance data obtained during this investigation are presented in tabular form. In hover, the rotor performance parameters C_T and C_Q are presented along with the corresponding rotor control angles A_1, B_1, and θ. For forward flight, rotor performance parameters C_L, C_D, and C_Q are presented with the control angles α_s, A_1, B_1, and θ as well as with μ and $M_{1,90}$. A linear correction based on point number and determined from prerun and postrun voltage readings is applied to performance data to remove any amplifier voltage drift that may have occurred during the run.

The quality of performance data obtained during this test, with regard to repeatability, was addressed. During the conduct of the test, randomly selected "target" data points were repeated. Approximately 5 percent of the forward-flight data were used as repeat points. The average deviation in C_L, C_D, and C_Q was determined from the differences between the "target" values and the repeated values. The average deviations for constant α_s and μ were determined to be as follows:

$$C_L \pm 0.00004$$

$$C_D \pm 0.00001$$

$$C_Q \pm 0.00001$$

The data presented are grouped according to rotor Lock number, tunnel operating density, and advancing blade-tip Mach number. Performance data may be referenced by point and run number in order to cross-reference the test conditions. The data are presented in the following order:

Concluding Remarks

Performance data have been compiled for four scale-model helicopter rotors incorporating differences in structural and geometric parameters. The test compared two main-rotor systems in order to evaluate differences between an advanced main-rotor design for possible use on a utility-class helicopter relative to an existing baseline rotor design for the same aircraft. As was shown in NASA TM-89129, the advanced-design rotor exhibited performance improvements over the baseline rotor in hover above a rotor lift coefficient (C_L) of 0.00625 as well as at all forward-flight conditions. Also included are performance data from vibration-reduction test points. Although no analysis of the data is presented herein, cross-referencing of performance data from blade set to blade set at specific tunnel operating densities and tip Mach numbers may be useful to the analyst for validating rotor aeroelastic theories and design methodologies.

NASA Langley Research Center
Hampton, VA 23665-5225

March 15, 1990

References

1. Hammond, Charles Eugene; and Weller, William Henry: *Wind-Tunnel Testing of Aeroelastically Scaled Helicopter Rotor Models.* U.S. Army paper presented at the 1976 Army Science Conference (West Point, New York), June 22–25, 1976.
2. Yeager, William T., Jr.; Mantay, Wayne R.; Wilbur, Matthew L.; Cramer, Robert G., Jr.; and Singleton, Jeffrey D.: *Wind-Tunnel Evaluation of an Advanced Main-Rotor Blade Design for a Utility-Class Helicopter.* NASA TM-89129, AVSCOM TM-87-B-8, 1987.

3. Bingham, Gene J.: The Aerodynamic Influences of Rotor Blade Airfoils, Twist, Taper and Solidity on Hover and Forward Flight Performance. *37th Annual Forum Proceedings, American Helicopter Soc.*, 1981, pp. 37–50.
4. Gessow, Alfred; and Myers, Garry C., Jr.: *Aerodynamics of the Helicopter.* Macmillan Co., c.1952. (Republished 1967 by Frederick Ungar Publ. Co.)
5. Van Gaasbeek, J. R.: *Rotorcraft Flight Simulation, Computer Program C81. Volume II—User's Manual.* USARTL-TR-77-54B, U.S. Army, Oct. 1979. (Available from DTIC as AD A079 632.)
6. Lee, Charles: *Weight Considerations in Dynamically Similar Model Rotor Design.* SAWE Paper No. 659, May 1968.
7. Johnson, Wayne: *A Comprehensive Analytical Model of Rotorcraft Aerodynamics and Dynamics. Part I: Analysis Development.* NASA TM-81182, AVRADCOM TR-80-A-5, 1980.
8. Johnson, Wayne: *A Comprehensive Analytical Model of Rotorcraft Aerodynamics and Dynamics. Part II: User's Manual.* NASA TM-81183, USAAVSCOM TR 80-A-6, 1980.
9. Noonan, Kevin W.; and Bingham, Gene J.: *Aerodynamic Characteristics of Three Helicopter Rotor Airfoil Selections at Reynolds Numbers From Model Scale to Full Scale at Mach Numbers From 0.35 to 0.90.* NASA TP-1701, AVRADCOM TR 80-B-5, 1980.
10. Bingham, Gene J.; and Noonan, Kevin W.: *Two-Dimensional Aerodynamic Characteristics of Three Rotorcraft Airfoils at Mach Numbers From 0.35 to 0.90.* NASA TP-2000, AVRADCOM TR-82-B-2, 1982.
11. Mantay, Wayne R.; Yeager, William T., Jr.; Hamouda, M-Nabil; Cramer, Robert G., Jr.; and Langston, Chester W.: *Aeroelastic Model Helicopter Rotor Testing in the Langley TDT.* NASA TM-86440, USAAVSCOM TM 85-B-5, 1985.

Table 1. Properties of Baseline Stiff Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft^2			I_θ, lb-sec^2/ft
			Flap	Chord	Torsion	
0.0534	0.1073	0.02460	101 944.0	104 166.7	6763.9	0.190×10^{-3}
.0763	.1078	.01710	101 944.0	104 166.7	6763.9	.190
.0993	.1068	.01690	101 944.0	104 166.7	6763.9	.190
.1221	.0005	.00004	51 319.2	55 006.8	3496.4	.100
.1222	.1776	.01620	512.1	5 847.5	228.8	.006
.1601	.3331	.00790	323.5	5 847.5	228.8	.006
.2312	.2502	.00500	311.3	5 847.5	228.8	.006
.2846	.0618	.00100	305.4	5 847.5	228.8	.006
.2978	.2052	.00330	305.4	5 847.5	228.8	.006
.3416	.2057	.00330	305.4	5 847.5	228.8	.006
.3855	.2057	.00330	305.4	5 847.5	228.8	.006
.4294	.2057	.00330	305.4	5 847.5	228.8	.006
.4733	.2057	.00330	305.4	5 847.5	228.8	.006
.5172	.2057	.00330	305.4	5 847.5	228.8	.006
.5611	.2057	.00330	305.4	5 847.5	230.4	.006
.6050	.2057	.00330	305.4	5 847.5	232.8	.006
.6489	.2057	.00330	305.4	5 847.5	234.4	.006
.6928	.2057	.00330	305.4	5 847.5	235.9	.006
.7367	.2057	.00330	305.4	5 847.5	236.6	.006
.7805	.2057	.00330	305.4	5 847.5	236.3	.006
.8244	.2057	.00330	297.3	5 847.5	235.0	.006
.8683	.1818	.00250	282.6	5 847.5	231.8	.006
.9071	.1003	.00110	270.9	5 847.5	228.1	.006
.9285	.0005	.00001	265.8	5 847.5	226.6	.006
.9286	.0661	.00064	259.4	5 847.5	225.2	.006
.9427	.0628	.00050	252.6	5 847.5	222.6	.006
.9561	.2057	.00170	177.8	5 847.5	215.0	.006

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	3.04
Flap	6.46
Chord	7.86

[a]$\Omega = 68.07$ rad/sec.

Table 2. Properties of Advanced-Design Stiff Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft^2			I_θ, lb-sec^2/ft
			Flap	Chord	Torsion	
0.0534	0.1073	0.02460	101 944.0	104 166.7	6 763.9	4.095×10^{-3}
.0763	.1078	.01710	101 944.0	104 166.7	6 763.9	.190
.0993	.1068	.01690	101 944.0	104 166.7	12 625.0	.190
.1221	.0005	.00004	51 601.4	59 432.4	6 813.0	.177
.1222	.6358	.01300	1 258.7	14 698.0	1 000.9	.164
.2579	.2914	.00590	1 102.5	14 698.0	996.3	.164
.3201	.1007	.00210	946.2	14 698.0	991.7	.164
.3416	.2057	.00420	946.2	14 698.0	991.7	.164
.3855	.2057	.00420	946.2	14 698.0	991.7	.164
.4294	.2057	.00420	946.2	14 698.0	991.7	.164
.4733	.2057	.00420	946.2	14 698.0	991.7	.164
.5172	.2057	.00420	946.2	14 698.0	991.7	.164
.5611	.2057	.00420	946.2	14 698.0	991.7	.164
.6050	.2057	.00420	946.2	14 698.0	991.7	.164
.6489	.2057	.00420	946.2	14 698.0	991.7	.164
.6928	.2057	.00420	946.2	14 698.0	991.7	.164
.7367	.2151	.00440	946.2	14 698.0	991.7	.164
.7826	.0815	.00170	923.1	14 698.0	978.8	.164
.8000	.0005	.00001	900.0	14 698.0	965.9	.164
.8001	.1551	.00310	750.4	14 698.0	965.9	.164
.8332	.2628	.00390	428.0	14 698.0	953.0	.164
.8893	.2511	.00180	201.4	14 698.0	904.1	.164
.9429	.2675	.00080	94.7	14 698.0	834.2	.164

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	3.96
Flap	10.13
Chord	12.17

[a]$\Omega = 68.07$ rad/sec.

Table 3. Properties of Baseline Elastic Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft^2			I_θ, lb-sec^2/ft
			Flap	Chord	Torsion	
0.0534	0.322	0.0510	101 944.0	104 166.7	6763.9	0.570×10^{-3}
.1222	.166	.0110	9 326.4	69 444.4	1269.6	.143
.1577	.333	.0062	9 326.4	2 777.8	432.1	.050
.2288	.333	.0062	74.3	2 777.8	236.1	.050
.2999	.333	.0062	74.3	2 777.8	88.9	.050
.3710	.333	.0062	74.3	2 777.8	88.9	.080
.4421	.333	.0062	81.3	2 777.8	91.6	.080
.5132	.333	.0062	75.7	2 777.8	93.1	.080
.5843	.333	.0062	81.3	2 777.8	94.4	.080
.6554	.333	.0062	81.3	2 777.8	94.4	.080
.7265	.333	.0062	81.3	2 777.8	94.4	.080
.7976	.333	.0062	86.8	2 777.8	92.4	.080
.8687	.207	.0054	33.3	694.4	95.4	.117
.9128	.073	.0024	33.3	694.4	27.1	.117
.9283	.336	.0045	21.5	347.2	22.0	.117

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	2.69
Flap	4.76
Chord	5.12
Torsion	7.21
Flap	8.16

[a]$\Omega = 69.32$ rad/sec.

Table 4. Properties of Advanced-Design Elastic Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft^2			I_θ, lb-sec^2/ft
			Flap	Chord	Torsion	
0.0534	0.1070	0.02460	101 944.0	104 166.7	6 763.9	0.570×10^{-3}
.0763	.2150	.03400	101 944.0	104 166.7	6 763.9	.190
.1221	.0005	.00004	101 944.0	104 166.7	6 763.9	.190
.1222	.1770	.00410	2 500.0	10 277.8	12 625.0	.242
.1600	.2480	.00430	354.1	10 277.8	261.1	.242
.2130	.1690	.00260	302.1	10 277.8	261.1	.226
.2490	.5200	.01220	270.1	10 277.8	261.1	.359
.3600	.9650	.02260	225.7	10 277.8	261.1	.359
.5659	.3330	.00790	225.7	10 277.8	261.1	.359
.6370	.0420	.00100	295.1	10 277.8	428.8	.228
.6460	.2670	.00670	258.3	10 277.8	288.2	.359
.7030	.4120	.01030	251.7	10 277.8	270.8	.373
.7910	.3370	.00780	236.1	10 277.8	256.9	.359
.8630	.3320	.00670	138.9	10 277.8	217.7	.305
.9340	.2060	.00270	79.9	10 277.8	163.2	.140
.9780	.1030	.00076	62.5	10 277.8	86.8	.074

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	2.86
Flap	5.71
Chord	8.46
Flap	9.90

[a]$\Omega = 69.32$ rad/sec.

Table 5. Lock Number and Tunnel Operating Densities for Baseline and Advanced Stiff Rotors

Blade set (a)	ρ, slugs/ft^3	I_b, slug-ft^2	M_T	γ	Table
Baseline (0.00469)	0.0023	0.4383	0.285	4.58	7(a)
	.00382	↓	.65	7.61	7(b)
	.00469	↓	.65	9.35	7(c)
	.006	↓	.65	11.95	7(d)
	.0075	↓	.65	14.94	7(e)
	.009	↓	.65	17.93	7(f)
Baseline (0.006)	0.006	0.5602	0.628	9.35	8(a)
	.006	.5602	.65	9.35	8(b)
Baseline (0.0076)	0.0076	0.7092	0.628	9.35	9(a)
	.0076	.7092	.65	9.35	9(b)
Advanced (0.00382)	0.0023	0.4186	0.284	5.89	11(a)
	.00382	↓	.65	9.78	11(b)
	.006	↓	.65	15.36	11(c)
	.0075	↓	.65	19.20	11(d)
	.009	↓	.65	23.04	11(e)
Advanced (0.006)	0.006	0.6735	0.628	9.55	12(a)
	.006	↓	.65	9.55	12(b)
	.009	↓	.628	14.32	12(c)
	.009	↓	.65	14.32	12(d)

[a]Design tunnel operating density is given in parentheses.

Table 6. Lock Number and Tunnel Operating Densities for Baseline and Advanced Elastic Rotors

Blade set (a)	ρ, slugs/ft^3	I_b, slug-ft^2	M_T or masses added	γ	Table
Baseline (0.006)	0.006	0.5602	0.628	9.30	10(a)
	.006	.5602	.65	9.30	10(b)
Advanced (0.006)	0.00382	0.6735	0.65	6.08	13(a)
	.006	.6735	.628	9.55	13(b)
	.006	.6735	.65	9.55	13(c)
Advanced (modal shaping)	0.006	0.6735	5 masses @ 60% radius	9.55	14(a)
	.006	.6735	3 masses @ 60% radius	9.55	14(b)
	.006	.6735	7 masses @ 60% radius	9.55	14(c)

[a]Design tunnel operating density is given in parentheses.

Table 7. Rotor Performance Data for Baseline Stiff Blade Set With $I_b = 0.4383$ slug-ft^2

(a) $\rho = 0.0023$ slug/ft^3 (atmospheric air); $M_T = 0.285$; $\gamma = 4.58$

RUN	12	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
220	.1	.1	2.0	.00057	.00012
221	.1	.1	4.0	.00150	.00014
222	.1	.1	6.0	.00248	.00019
223	.2	.1	8.0	.00374	.00027
224	.2	.1	9.9	.00509	.00038
225	.2	.1	12.0	.00663	.00052
227	.3	.1	16.0	.00966	.00091
228	.2	.1	18.0	.01110	.00115
229	.2	.1	18.9	.01193	.00128
230	.2	.1	19.9	.01252	.00143
231	.2	.1	21.0	.01306	.00162
232	.3	.2	17.9	.01118	.00116
234	.3	.2	14.0	.00813	.00072
235	.4	.2	10.0	.00520	.00040
236	.3	.3	6.0	.00260	.00020

(b) $\rho = 0.00382$ slug/ft^3; $M_T = 0.65$; $\gamma = 7.61$

RUN	46	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
1292	-.3	-.1	2.0	.00142	.00015
1293	-.4	.1	4.0	.00234	.00019
1294	-.5	.1	6.0	.00357	.00026
1295	-.5	.2	7.9	.00483	.00036
1296	-.6	.3	9.9	.00620	.00049
1297	-.6	.1	12.0	.00761	.00066
1298	-.8	.3	13.9	.00912	.00085
1299	-.7	.0	15.9	.01059	.00111
1300	-.6	.3	14.0	.00923	.00087
1301	-.5	.4	11.9	.00779	.00067
1302	-.6	-.1	10.0	.00635	.00051
1303	-.6	.0	7.9	.00493	.00038
1304	-.5	.4	5.9	.00372	.00027

Table 7. Continued

(b) Continued

RUN	8								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
118	-1.8	-1.4	1.1	4.2	.156	.756	.00263	-.00001	.00013
119	-1.8	-2.0	1.6	6.2	.155	.757	.00425	-.00006	.00018
120	-1.8	-2.8	1.9	8.3	.154	.756	.00589	-.00012	.00025
121	-1.8	-3.1	2.3	9.3	.153	.757	.00668	-.00015	.00030
122	-1.8	-3.5	2.6	10.0	.155	.758	.00718	-.00019	.00034
123	-1.8	-4.3	2.9	12.1	.153	.757	.00864	-.00025	.00046
124	-1.8	-4.8	3.5	14.0	.154	.756	.00994	-.00031	.00062
125	-1.8	-5.8	4.1	16.0	.155	.758	.01095	-.00042	.00085
126	-3.4	-3.1	3.3	9.6	.205	.792	.00660	-.00029	.00032
127	-3.4	-3.4	3.3	10.0	.205	.792	.00697	-.00030	.00035
128	-3.4	-4.0	4.0	12.0	.203	.791	.00835	-.00040	.00046
129	-3.4	-4.8	4.7	14.1	.203	.790	.00973	-.00052	.00062
130	-3.4	-5.8	5.7	16.0	.206	.791	.01059	-.00069	.00084
131	-3.3	-2.3	2.9	8.2	.207	.792	.00559	-.00018	.00026
132	-3.3	-1.7	2.0	6.3	.210	.794	.00403	-.00008	.00019
133	-3.3	-1.1	1.5	4.1	.208	.793	.00218	.00002	.00014
134	-5.2	-3.3	4.3	10.7	.255	.825	.00650	-.00048	.00038
135	-5.2	-3.8	4.8	12.3	.254	.824	.00770	-.00058	.00047
136	-5.2	-4.7	5.6	14.2	.253	.824	.00894	-.00072	.00062
137	-5.3	-5.6	6.6	16.1	.254	.824	.00976	-.00090	.00083
141	-5.2	-.4	1.8	4.0	.256	.826	.00118	.00007	.00014
RUN	9								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
145	-6.2	-3.5	5.5	11.9	.307	.852	.00657	-.00058	.00044
146	-6.2	-4.5	6.6	13.8	.307	.850	.00784	-.00075	.00057
147	-6.2	-5.5	7.4	15.9	.307	.850	.00899	-.00093	.00077
148	-6.2	-2.1	4.7	10.0	.307	.850	.00533	-.00037	.00033
149	-6.2	-2.4	4.6	9.9	.307	.850	.00526	-.00038	.00033
150	-6.2	-1.6	3.7	8.0	.307	.850	.00375	-.00021	.00024
151	-6.2	-.9	2.7	5.9	.306	.849	.00220	-.00002	.00017
152	-9.2	-4.0	7.0	14.4	.355	.888	.00649	-.00083	.00064
153	-9.2	-4.6	7.7	15.9	.353	.888	.00741	-.00097	.00076
154	-9.1	-2.8	5.6	11.7	.354	.888	.00457	-.00047	.00043
155	-9.1	-1.7	4.8	9.8	.352	.888	.00330	-.00022	.00032
156	-9.1	-1.0	3.6	7.8	.352	.888	.00183	.00003	.00021
157	-11.7	-4.8	8.4	17.3	.401	.923	.00641	-.00106	.00086
158	-11.7	-5.3	8.7	18.3	.402	.924	.00716	-.00123	.00098
159	-11.7	-5.9	9.3	19.4	.401	.924	.00774	-.00139	.00112
160	-11.8	-3.6	7.6	16.1	.400	.923	.00582	-.00090	.00073
161	-11.7	-2.7	6.4	13.9	.399	.922	.00439	-.00060	.00054
162	-11.7	-1.8	5.5	11.8	.401	.923	.00283	-.00027	.00036

Table 7. Continued

(b) Continued

RUN	43								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1198	.0	-2.2	1.2	2.0	.154	.752	.00282	.00004	.00012
1199	.0	-2.8	1.5	4.0	.154	.752	.00434	.00002	.00015
1200	.0	-3.5	1.9	6.0	.151	.749	.00582	.00001	.00021
1201	.0	-4.2	2.3	8.0	.149	.748	.00730	-.00001	.00030
1202	.0	-4.9	2.7	10.0	.154	.752	.00865	-.00005	.00041
1203	.0	-5.8	3.3	12.0	.151	.749	.00987	-.00010	.00057
1204	.0	-6.9	3.9	14.0	.152	.750	.01084	-.00022	.00079
1205	.0	-8.2	4.6	16.0	.157	.754	.01144	-.00038	.00107
1206	-5.0	-7.3	4.6	16.0	.152	.750	.01070	-.00121	.00106
1207	-5.0	-6.1	3.8	14.0	.155	.753	.00999	-.00099	.00080
1208	-5.0	-5.0	3.3	12.0	.153	.752	.00894	-.00080	.00059
1209	-5.0	-4.3	2.7	10.0	.152	.750	.00768	-.00065	.00045
1210	-5.0	-3.7	2.3	8.0	.153	.752	.00631	-.00051	.00034
1211	-5.0	-3.0	1.9	6.0	.155	.753	.00484	-.00038	.00025
1212	-5.0	-2.4	1.5	4.0	.158	.755	.00335	-.00025	.00018
RUN	44								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1216	.0	-2.7	2.4	4.1	.204	.784	.00444	.00002	.00014
1217	.0	-3.4	3.0	6.0	.202	.783	.00594	-.00001	.00020
1218	.0	-4.2	3.5	8.0	.201	.782	.00745	-.00004	.00028
1219	.0	-5.1	4.3	10.0	.201	.782	.00876	-.00009	.00039
1220	.0	-6.0	5.0	12.0	.202	.783	.00988	-.00019	.00055
1221	.0	-7.2	5.9	14.0	.200	.781	.01065	-.00034	.00077
1222	-5.0	-6.3	5.5	14.0	.202	.782	.00982	-.00104	.00077
1225	-5.0	-4.3	4.0	10.0	.204	.785	.00754	-.00063	.00043
1226	-5.0	-3.6	3.4	8.0	.204	.785	.00612	-.00048	.00033
1227	-5.0	-2.8	2.9	6.1	.204	.785	.00465	-.00033	.00024
1228	.0	-3.4	3.9	6.0	.255	.818	.00582	.00004	.00019
1229	.0	-4.2	4.6	8.0	.254	.817	.00727	.00000	.00026
1230	.0	-5.2	5.5	10.1	.254	.817	.00861	-.00006	.00038
1231	.0	-6.4	6.5	12.0	.255	.818	.00954	-.00021	.00056
1232	.0	-7.6	7.6	14.0	.252	.817	.01019	-.00039	.00082
1233	-7.5	-6.0	6.4	14.1	.254	.818	.00883	-.00123	.00075
1234	-7.5	-7.4	7.4	16.0	.254	.818	.00949	-.00150	.00103
1237	-7.5	-3.9	4.8	10.0	.254	.818	.00631	-.00077	.00045
1238	-7.5	-3.2	4.0	8.0	.253	.818	.00492	-.00055	.00034
1239	-7.9	-2.9	4.6	8.0	.303	.851	.00407	-.00043	.00032
1240	-7.9	-3.9	5.4	10.0	.303	.851	.00542	-.00066	.00043
1241	-8.0	-4.8	6.4	12.0	.302	.850	.00675	-.00087	.00056
1242	-7.9	-5.8	7.3	14.0	.302	.850	.00797	-.00109	.00072
1243	-8.0	-7.3	8.2	16.0	.302	.850	.00876	-.00136	.00097
1244	.0	-5.2	6.6	10.0	.304	.849	.00813	-.00004	.00037
1245	.0	-3.3	4.6	6.0	.305	.850	.00546	.00005	.00019

Table 7. Continued

(b) Concluded

RUN	44								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1246	.0	-4.2	5.6	8.0	.304	.849	.00685	.00001	.00026
1247	.0	-6.3	7.6	12.0	.304	.849	.00908	-.00019	.00054
1248	.0	-7.0	8.2	13.0	.304	.849	.00944	-.00030	.00067
1249	-5.0	-4.2	6.6	10.0	.356	.884	.00576	-.00042	.00041
1250	-5.0	-5.2	7.7	12.0	.356	.884	.00693	-.00057	.00053
1251	-5.0	-6.5	8.6	14.1	.356	.884	.00803	-.00075	.00071
1252	-5.0	-8.0	9.5	16.1	.356	.883	.00876	-.00098	.00099
1253	-8.0	-4.5	7.5	12.1	.403	.916	.00507	-.00054	.00052
1256	-8.0	-6.8	9.5	16.0	.404	.915	.00742	-.00095	.00088
1257	-8.0	-7.6	9.9	17.0	.404	.914	.00788	-.00109	.00103
1258	-8.0	-4.7	4.4	12.1	.202	.782	.00817	-.00112	.00060
1259	-5.0	-5.2	4.7	12.0	.204	.783	.00878	-.00078	.00057
1260	-5.0	-6.4	5.5	14.0	.203	.782	.00977	-.00099	.00078
1261	-5.0	-4.4	4.0	10.1	.203	.783	.00751	-.00063	.00044

(c) $\rho = 0.00469$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.35$

RUN	47	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
1308	-.1	.0	2.1	.00145	.00015
1309	-.3	.3	4.0	.00239	.00019
1310	-.5	.0	6.0	.00352	.00026
1311	-.7	.3	8.0	.00468	.00036
1312	-.7	.4	10.0	.00609	.00048
1313	-.6	.5	12.0	.00742	.00063
1314	-.9	.3	14.0	.00875	.00081
1315	-.9	.4	15.0	.00951	.00092
1316	-.7	.5	14.0	.00873	.00081
1317	-.3	.3	12.0	.00744	.00063
1318	-.4	.2	10.0	.00612	.00049
1319	-.4	.2	8.0	.00474	.00036
1321	-.5	.1	6.0	.00350	.00027

Table 7. Continued

(c) Continued

RUN	41								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1074	.0	-2.1	1.3	2.0	.152	.755	.00262	.00004	.00013
1075	.0	-2.7	1.6	4.0	.151	.754	.00410	.00003	.00016
1076	.0	-3.4	1.9	6.0	.151	.754	.00559	.00002	.00022
1077	.0	-4.1	2.2	8.0	.151	.754	.00703	.00000	.00030
1078	.0	-4.8	2.5	10.0	.151	.754	.00842	-.00002	.00041
1079	.0	-5.5	3.0	12.0	.151	.754	.00961	-.00006	.00055
1080	.0	-6.5	3.3	14.0	.152	.754	.01066	-.00014	.00073
1081	.0	-7.1	3.6	15.0	.152	.754	.01109	-.00019	.00084
1082	-1.8	-5.3	2.9	12.0	.149	.753	.00926	-.00031	.00056
1083	-1.8	-6.3	3.3	14.0	.151	.754	.01034	-.00043	.00074
1084	-1.8	-6.9	3.6	15.0	.152	.754	.01075	-.00051	.00085
1085	-1.8	-4.6	2.6	10.0	.151	.754	.00803	-.00023	.00044
1086	-1.8	-3.9	2.2	8.0	.151	.754	.00671	-.00017	.00033
1087	-1.8	-3.2	1.9	6.0	.153	.755	.00529	-.00011	.00025
1088	-1.8	-2.5	1.6	4.0	.153	.755	.00382	-.00005	.00020
1089	-1.8	-1.9	1.3	2.0	.155	.756	.00236	.00001	.00016
1090	-5.0	-2.2	1.5	4.0	.153	.755	.00324	-.00019	.00021
1092	-5.0	-3.6	2.2	8.0	.149	.753	.00610	-.00046	.00036
1093	-5.0	-3.6	2.2	8.0	.150	.753	.00610	-.00046	.00036
1094	-5.0	-4.3	2.5	10.0	.153	.755	.00747	-.00059	.00046
1095	-5.0	-5.0	2.9	12.1	.149	.753	.00879	-.00072	.00060
1096	-5.0	-5.9	3.2	14.0	.153	.755	.00989	-.00089	.00076
1097	-5.0	-6.4	3.5	15.0	.152	.754	.01033	-.00097	.00086
1098	-5.0	-5.1	4.3	12.0	.203	.788	.00858	-.00071	.00056
1099	-5.0	-6.2	4.9	14.0	.202	.788	.00974	-.00088	.00073
1100	-5.0	-7.5	5.5	16.0	.201	.787	.01047	-.00108	.00097
1101	-5.0	-4.3	3.7	10.0	.203	.788	.00726	-.00055	.00045
1102	-5.0	-3.5	3.2	8.0	.204	.789	.00589	-.00040	.00035
1103	-5.0	-2.7	2.7	6.0	.205	.790	.00438	-.00024	.00026
1104	-5.0	-1.9	2.2	4.0	.205	.790	.00298	-.00010	.00020
1105	-3.3	-1.5	1.7	2.1	.204	.789	.00190	.00005	.00016
1106	-3.3	-2.2	2.3	4.0	.204	.789	.00336	-.00006	.00019
1107	-3.3	-2.9	2.8	6.0	.205	.790	.00485	-.00018	.00025
1108	-3.3	-3.7	3.3	8.0	.204	.788	.00632	-.00029	.00033
1109	-3.3	-4.5	3.9	10.0	.203	.787	.00774	-.00040	.00042
1110	-3.3	-5.3	4.4	12.0	.202	.786	.00898	-.00053	.00055
1111	-3.3	-6.5	5.0	14.0	.202	.786	.01001	-.00069	.00072
1112	-3.3	-7.8	5.8	16.0	.203	.787	.01068	-.00088	.00096
1113	-3.1	-3.8	3.3	8.3	.205	.788	.00663	-.00030	.00033
1114	.0	-1.8	1.9	2.0	.206	.789	.00267	.00010	.00013
1115	.0	-2.5	2.4	4.0	.205	.788	.00427	.00008	.00016
1116	.0	-3.2	2.8	6.0	.204	.788	.00579	.00005	.00021
1117	.0	-4.1	3.4	8.0	.205	.788	.00723	.00000	.00028
1118	.0	-4.9	3.9	10.0	.204	.788	.00860	-.00004	.00038
1119	.0	-5.9	4.5	12.0	.203	.787	.00977	-.00013	.00052
1120	.0	-7.0	5.2	14.0	.203	.787	.01065	-.00025	.00071

Table 7. Continued

(c) Continued

RUN	41	(cont)							
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1121	.0	-7.7	5.6	15.0	.203	.787	.01098	-.00034	.00083
1122	.0	-6.1	5.9	11.9	.255	.821	.00942	-.00015	.00049
1123	.0	-7.4	6.8	14.0	.254	.821	.01019	-.00031	.00071
1124	.0	-5.0	5.1	10.0	.254	.821	.00833	-.00006	.00035
1125	.1	-4.1	4.4	8.0	.254	.821	.00702	.00000	.00025
1126	.1	-3.2	3.7	6.0	.255	.822	.00557	.00003	.00019
1127	.1	-2.3	3.0	4.1	.254	.821	.00412	.00007	.00014
1128	.1	-1.5	2.3	2.0	.255	.821	.00257	.00010	.00011
RUN	42								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1135	-5.2	-1.7	2.7	4.0	.251	.819	.00246	-.00009	.00017
1136	-5.2	-2.5	3.4	6.0	.252	.820	.00392	-.00025	.00023
1137	-5.2	-3.4	4.0	8.0	.250	.819	.00536	-.00041	.00031
1138	-3.9	-4.0	4.5	9.1	.250	.818	.00661	-.00039	.00036
1139	-5.2	-4.2	4.7	10.0	.250	.819	.00677	-.00056	.00041
1140	-5.2	-5.2	5.4	12.0	.249	.818	.00805	-.00072	.00053
1141	-5.2	-6.2	6.1	14.0	.248	.818	.00915	-.00088	.00069
1142	-5.2	-7.7	6.8	16.0	.248	.817	.00991	-.00111	.00094
1143	-7.5	-4.7	5.2	12.0	.249	.818	.00744	-.00092	.00056
1144	-7.5	-5.8	5.8	13.9	.248	.817	.00867	-.00113	.00071
1145	-7.5	-7.1	6.6	16.0	.248	.818	.00953	-.00136	.00093
1146	-7.5	-3.8	4.5	10.0	.247	.818	.00609	-.00069	.00044
1147	-7.5	-3.0	3.8	7.9	.247	.817	.00468	-.00047	.00034
1148	-7.5	-2.2	3.1	5.9	.247	.817	.00321	-.00025	.00025
1149	-7.9	-1.9	3.5	5.9	.300	.852	.00238	-.00011	.00023
1150	-8.0	-2.7	4.4	7.9	.300	.852	.00378	-.00034	.00032
1151	-8.0	-3.7	5.2	10.0	.301	.852	.00516	-.00057	.00043
1152	-8.0	-4.7	6.0	12.0	.302	.852	.00649	-.00079	.00055
1153	-8.0	-5.7	6.8	13.9	.302	.853	.00769	-.00101	.00069
1154	-8.0	-7.1	7.5	16.0	.302	.853	.00870	-.00126	.00090
1155	-6.2	-5.0	6.3	12.0	.304	.854	.00704	-.00067	.00054
1156	-6.2	-6.1	7.0	14.0	.304	.853	.00820	-.00085	.00068
1157	-6.2	-7.6	7.8	16.0	.303	.851	.00907	-.00108	.00092
1158	-6.1	-4.5	5.9	11.2	.303	.852	.00654	-.00057	.00049
1159	-6.2	-4.0	5.4	10.0	.303	.852	.00574	-.00048	.00042
1160	-6.2	-3.0	4.6	8.0	.302	.851	.00442	-.00031	.00033
1161	-6.2	-2.1	3.8	6.0	.302	.851	.00304	-.00012	.00024
1162	.0	-2.0	3.7	4.0	.304	.851	.00376	.00015	.00016
1164	.0	-3.0	4.5	6.0	.304	.852	.00522	.00008	.00020
1165	.0	-4.0	5.4	8.0	.304	.851	.00659	.00003	.00027
1166	.0	-5.0	6.2	9.9	.305	.852	.00784	-.00003	.00035
1167	.0	-6.2	7.1	12.0	.306	.853	.00890	-.00014	.00049

Table 7. Continued

(c) Concluded

RUN	42								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1168	.0	-6.9	7.5	13.0	.306	.853	.00935	-.00022	.00059
1169	.0	-7.5	8.0	14.0	.305	.852	.00973	-.00030	.00070
1170	-5.0	-1.9	4.4	6.0	.352	.885	.00289	-.00004	.00023
1171	-5.0	-2.9	5.3	7.9	.353	.886	.00418	-.00020	.00031
1172	-5.0	-4.0	6.1	9.9	.353	.886	.00549	-.00035	.00041
1173	-5.0	-5.1	7.1	12.0	.354	.885	.00671	-.00051	.00052
1174	-5.0	-6.2	8.0	13.9	.353	.885	.00782	-.00066	.00066
1175	-5.0	-7.8	8.7	15.9	.354	.885	.00868	-.00086	.00090
1176	-9.2	-4.4	6.5	12.0	.350	.885	.00517	-.00070	.00053
1177	-7.8	-5.3	7.2	13.5	.352	.885	.00661	-.00080	.00064
1178	-9.1	-5.4	7.1	13.9	.350	.885	.00647	-.00091	.00068
1179	-9.1	-6.6	8.0	15.9	.350	.883	.00765	-.00115	.00086
1180	-9.1	-7.4	8.2	17.0	.350	.885	.00815	-.00128	.00098
1182	-9.1	-2.2	4.6	8.0	.349	.884	.00264	-.00015	.00029
1183	-7.9	-2.0	5.1	7.9	.400	.918	.00241	.00003	.00027
1184	-7.9	-3.1	6.1	10.0	.402	.919	.00359	-.00019	.00038
1185	-7.9	-4.1	7.0	12.0	.401	.917	.00485	-.00040	.00051
1186	-7.9	-5.3	7.9	14.0	.402	.918	.00612	-.00062	.00066
1187	-7.9	-6.7	8.8	15.9	.402	.918	.00715	-.00083	.00084
1188	-8.0	-7.4	9.1	17.0	.402	.918	.00775	-.00094	.00096
1189	-11.8	-2.2	5.4	9.9	.397	.918	.00219	-.00009	.00031
1191	-11.8	-4.5	7.2	14.0	.398	.918	.00455	-.00072	.00061
1192	-11.8	-5.8	8.0	15.9	.398	.918	.00576	-.00103	.00080
1193	-10.3	-6.4	8.4	16.3	.400	.918	.00654	-.00106	.00086
1194	-11.7	-6.4	8.4	16.9	.398	.919	.00643	-.00121	.00091

Table 7. Continued

(d) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 11.95$

RUN	10								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
166	-1.9	-3.2	1.9	9.9	.153	.751	.00658	-.00015	.00031
167	-1.9	-4.0	2.3	12.1	.154	.750	.00803	-.00022	.00041
168	-1.9	-4.6	2.6	14.1	.153	.751	.00925	-.00026	.00053
169	-1.9	-3.0	1.8	7.9	.153	.751	.00507	-.00013	.00023
170	-1.9	-1.9	1.5	6.2	.153	.751	.00385	-.00005	.00019
171	-1.9	-1.2	1.3	4.1	.157	.752	.00227	.00000	.00015
172	-3.3	-3.4	2.7	10.3	.202	.782	.00653	-.00031	.00032
173	-3.3	-4.0	3.3	12.1	.201	.782	.00768	-.00040	.00041
174	-3.3	-4.8	3.7	14.1	.201	.781	.00896	-.00050	.00052
175	-3.3	-5.1	3.8	15.0	.199	.781	.00956	-.00053	.00058
176	-3.3	-5.6	3.9	15.9	.199	.781	.01006	-.00058	.00065
177	-3.3	-5.9	4.2	17.0	.198	.780	.01057	-.00062	.00075
178	-3.3	-2.2	2.6	7.9	.201	.782	.00470	-.00019	.00023
179	-3.3	-1.5	2.0	6.1	.204	.783	.00335	-.00009	.00018
180	-3.3	-.8	1.6	4.1	.203	.783	.00183	.00002	.00014
184	-5.2	-2.8	3.7	11.3	.253	.815	.00637	-.00045	.00036
185	-5.2	-3.7	3.8	12.1	.253	.816	.00681	-.00053	.00039
186	-5.2	-4.3	4.7	14.2	.254	.815	.00824	-.00069	.00051
187	-5.2	-5.6	5.3	16.1	.253	.815	.00923	-.00086	.00065
188	-5.2	-6.1	5.6	16.9	.252	.814	.00960	-.00093	.00073
RUN	11								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
193	-5.2	-2.6	3.7	10.0	.253	.821	.00485	-.00035	.00029
194	-5.2	-1.7	3.1	8.0	.253	.823	.00336	-.00018	.00021
195	-6.2	-2.0	4.1	10.0	.304	.855	.00397	-.00028	.00029
196	-6.2	-3.1	4.8	12.0	.304	.856	.00526	-.00046	.00038
197	-6.2	-3.6	5.2	13.0	.306	.857	.00592	-.00056	.00043
198	-6.2	-3.9	5.4	13.7	.303	.855	.00644	-.00062	.00047
199	-6.2	-4.7	5.8	15.0	.304	.856	.00727	-.00075	.00055
200	-6.2	-5.9	6.4	17.0	.304	.856	.00849	-.00094	.00070
201	-6.2	-6.6	6.7	18.0	.304	.856	.00895	-.00103	.00079
206	-9.1	-3.8	6.0	14.9	.350	.889	.00551	-.00071	.00056
207	-9.2	-4.4	6.3	16.0	.351	.890	.00614	-.00083	.00063
208	-8.8	-4.5	6.4	16.3	.350	.890	.00652	-.00084	.00065
209	-9.2	-5.1	6.6	16.9	.353	.889	.00669	-.00095	.00070
210	-9.2	-5.4	6.6	17.5	.352	.891	.00706	-.00100	.00074
211	-11.7	-3.5	6.4	16.0	.396	.923	.00433	-.00060	.00057
213	-11.8	-4.0	6.8	17.0	.398	.924	.00493	-.00078	.00066
214	-11.8	-4.8	7.0	17.9	.398	.924	.00549	-.00094	.00075
215	-11.8	-5.2	7.2	18.4	.398	.924	.00575	-.00102	.00079

Table 7. Continued

(d) Continued

RUN	39								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1013	.0	-1.9	1.5	1.9	.151	.749	.00226	.00005	.00012
1014	.0	-2.6	1.7	3.9	.151	.748	.00374	.00003	.00015
1017	.0	-4.0	2.1	7.9	.150	.747	.00654	.00000	.00027
1018	.0	-4.7	2.3	9.9	.151	.748	.00786	-.00001	.00036
1019	.0	-5.4	2.6	11.9	.151	.748	.00901	-.00004	.00047
1020	.0	-6.3	2.8	14.0	.152	.749	.01016	-.00008	.00061
1021	.0	-6.8	2.9	14.9	.152	.749	.01064	-.00012	.00070
1022	-5.0	-6.0	3.0	14.9	.150	.748	.00982	-.00090	.00073
1023	-5.0	-5.6	2.8	13.9	.149	.748	.00931	-.00081	.00065
1024	-5.0	-4.7	2.7	11.9	.148	.747	.00814	-.00067	.00052
1025	-5.0	-4.1	2.4	9.9	.147	.746	.00691	-.00055	.00041
1026	-4.9	-3.4	2.1	7.9	.148	.747	.00560	-.00041	.00032
1027	-4.9	-2.7	1.9	6.0	.150	.748	.00429	-.00029	.00024
1028	-4.9	-2.6	2.6	5.9	.202	.782	.00402	-.00025	.00023
1029	-4.9	-3.4	3.0	7.9	.200	.781	.00539	-.00039	.00030
1031	-4.9	-5.0	3.9	11.9	.203	.783	.00801	-.00069	.00050
1032	-5.0	-6.0	4.3	13.9	.201	.782	.00921	-.00085	.00063
1033	.0	-4.8	3.6	9.9	.201	.782	.00799	-.00003	.00034
1034	.0	-5.7	4.0	11.9	.201	.780	.00924	-.00008	.00044
1035	.0	-6.8	4.4	13.9	.201	.781	.01027	-.00017	.00059
1036	.0	-3.9	3.2	7.9	.202	.782	.00668	.00000	.00025
1037	.0	-3.0	2.9	5.9	.203	.783	.00522	.00002	.00019

RUN	40								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1041	.1	-2.0	3.0	4.0	.255	.817	.00363	.00006	.00013
1042	.1	-3.0	3.6	6.0	.254	.818	.00505	.00001	.00017
1043	.1	-3.9	4.1	8.1	.255	.816	.00652	-.00003	.00023
1044	.1	-4.8	4.7	10.0	.253	.816	.00777	-.00008	.00030
1047	.1	-7.1	5.8	14.0	.255	.815	.00993	-.00025	.00056
1048	-7.4	-5.7	5.3	14.0	.252	.816	.00812	-.00113	.00063
1049	-7.4	-6.9	5.7	16.0	.252	.815	.00919	-.00132	.00079
1050	-7.4	-4.7	4.8	12.0	.253	.817	.00687	-.00090	.00050
1051	-7.4	-3.8	4.2	10.0	.254	.817	.00560	-.00069	.00039
1052	-7.4	-2.8	3.7	8.0	.254	.817	.00423	-.00048	.00030
1053	-7.9	-2.5	4.2	8.0	.302	.849	.00342	-.00035	.00029
1054	-7.9	-3.5	4.8	10.0	.303	.849	.00473	-.00057	.00038
1055	-7.9	-4.5	5.4	12.1	.303	.848	.00604	-.00079	.00050
1056	-7.9	-5.7	6.1	14.1	.302	.849	.00721	-.00102	.00063
1057	-7.9	-7.0	6.7	16.0	.303	.849	.00825	-.00124	.00078
1058	.1	-4.8	5.9	10.0	.305	.849	.00730	-.00007	.00031
1059	.1	-6.0	6.5	12.1	.304	.848	.00847	-.00016	.00041
1060	.1	-7.2	7.1	14.0	.305	.848	.00941	-.00029	.00057

Table 7. Continued

(d) Concluded

RUN	40								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1061	.1	-3.6	5.1	8.0	.305	.848	.00611	-.00005	.00023
1062	.1	-2.6	4.4	6.1	.305	.848	.00483	.00000	.00018
1063	-4.9	-3.6	5.8	10.0	.354	.881	.00508	-.00039	.00036
1064	-4.9	-4.8	6.6	12.1	.354	.882	.00627	-.00054	.00047
1065	-4.9	-6.1	7.2	14.0	.354	.882	.00734	-.00071	.00059
1066	-4.9	-6.9	7.4	15.0	.353	.881	.00787	-.00079	.00067
1067	-4.9	-7.7	7.6	16.0	.353	.881	.00832	-.00088	.00077
1068	-7.9	-3.7	6.5	12.0	.403	.915	.00442	-.00044	.00047
1069	-7.9	-5.1	7.2	14.0	.403	.915	.00549	-.00066	.00060
1070	-8.0	-6.6	7.8	16.0	.402	.915	.00664	-.00088	.00077

(e) $\rho = 0.0075$ slug/ft^3; $M_T = 0.65$; $\gamma = 14.94$

RUN	13								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
241	-1.8	-3.3	2.1	10.9	.151	.757	.00647	-.00016	.00030
242	-1.8	-3.8	2.2	12.0	.151	.755	.00722	-.00020	.00035
243	-1.8	-4.5	2.4	14.0	.151	.756	.00844	-.00025	.00045
244	-1.8	-4.6	2.5	14.5	.152	.757	.00873	-.00027	.00048
245	-1.8	-3.0	2.1	10.0	.153	.758	.00593	-.00014	.00027
246	-1.8	-2.1	2.0	8.0	.154	.758	.00452	-.00008	.00021
248	-1.8	-1.4	1.9	6.0	.152	.761	.00304	-.00002	.00016
249	-2.9	-3.1	3.1	11.3	.204	.795	.00640	-.00028	.00031
250	-3.3	-3.4	3.2	12.0	.203	.793	.00678	-.00035	.00035
251	-3.3	-3.6	3.3	12.6	.202	.794	.00711	-.00038	.00037
252	-3.3	-3.8	3.4	13.0	.203	.793	.00742	-.00040	.00039
253	-3.3	-4.0	3.5	13.5	.203	.793	.00771	-.00043	.00042
254	-3.3	-4.4	3.6	14.2	.202	.794	.00815	-.00047	.00045
255	-3.3	-4.5	3.7	14.6	.202	.793	.00839	-.00049	.00047
256	-3.3	-2.7	3.0	10.5	.205	.795	.00577	-.00027	.00029
257	-3.3	-1.8	2.7	8.5	.204	.794	.00434	-.00015	.00022
258	-3.3	-2.3	2.8	9.5	.204	.794	.00508	-.00021	.00025
259	-3.3	-2.7	3.0	10.6	.204	.794	.00579	-.00027	.00028
260	-4.6	-3.2	4.2	12.5	.254	.827	.00633	-.00046	.00036
261	-5.2	-3.6	4.4	13.6	.252	.827	.00683	-.00059	.00042
262	-5.2	-4.2	4.6	14.5	.252	.827	.00742	-.00067	.00047
264	-5.2	-2.6	3.9	11.6	.253	.828	.00549	-.00042	.00033
265	-5.2	-2.2	3.7	10.6	.252	.828	.00481	-.00034	.00029
266	-5.2	-1.6	3.4	9.5	.253	.828	.00418	-.00026	.00025
267	-5.2	-4.7	4.8	15.5	.253	.828	.00799	-.00075	.00052

Table 7. Continued

(e) Continued

RUN	14								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
271	-6.1	-3.7	5.3	14.2	.302	.862	.00632	-.00061	.00045
272	-6.2	-4.1	5.5	15.1	.303	.861	.00683	-.00070	.00050
273	-6.2	-4.7	5.7	16.1	.302	.861	.00738	-.00078	.00056
274	-6.2	-3.2	5.1	13.5	.302	.861	.00587	-.00055	.00042
275	-6.2	-2.4	4.7	12.1	.302	.861	.00498	-.00042	.00036
276	-6.2	-1.8	4.3	11.0	.303	.862	.00436	-.00031	.00031
277	-8.5	-4.5	6.2	16.8	.350	.894	.00630	-.00083	.00063
278	-9.2	-4.8	6.2	17.5	.349	.894	.00650	-.00094	.00068
279	-9.2	-5.4	6.3	18.0	.352	.888	.00684	-.00101	.00073
280	-9.2	-3.4	5.6	15.0	.350	.893	.00517	-.00066	.00053
281	-9.2	-2.7	5.3	14.0	.350	.893	.00463	-.00053	.00047
282	-9.2	-2.1	5.1	13.1	.350	.893	.00407	-.00042	.00042
283	-11.7	-4.7	6.5	18.2	.400	.922	.00524	-.00090	.00072
284	-11.7	-3.7	6.3	17.1	.396	.925	.00464	-.00073	.00062
285	-11.7	-2.9	6.0	16.0	.395	.925	.00406	-.00058	.00054
286	-11.7	-2.3	5.8	14.9	.395	.927	.00342	-.00042	.00046
RUN	37								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
933	.0	-1.9	1.6	1.9	.145	.748	.00201	.00006	.00012
934	.0	-2.6	1.6	4.0	.144	.748	.00336	.00004	.00015
935	.0	-3.2	1.8	5.9	.144	.748	.00468	.00002	.00019
936	.0	-4.0	1.9	7.9	.141	.746	.00598	.00000	.00025
937	.0	-4.7	1.9	9.9	.144	.747	.00735	-.00001	.00033
938	.0	-5.5	2.1	12.0	.144	.747	.00849	-.00004	.00043
939	.0	-5.8	2.1	12.9	.141	.746	.00900	-.00004	.00048
940	-5.0	-2.1	1.6	4.0	.144	.748	.00267	-.00018	.00017
941	-5.0	-2.7	1.7	5.9	.143	.747	.00395	-.00030	.00022
942	-5.0	-3.5	1.9	7.9	.142	.747	.00523	-.00043	.00029
943	-5.0	-4.2	2.0	9.9	.142	.747	.00650	-.00055	.00038
944	-5.0	-4.9	2.1	11.9	.142	.747	.00766	-.00066	.00047
945	-5.1	-5.2	2.1	12.9	.142	.747	.00818	-.00072	.00053
946	-5.0	-1.7	2.2	3.9	.197	.782	.00235	-.00009	.00017
947	-5.0	-2.4	2.6	5.9	.196	.781	.00371	-.00024	.00022
948	-5.0	-3.2	2.9	7.9	.195	.781	.00504	-.00038	.00028
950	-5.0	-4.1	3.1	9.9	.195	.781	.00630	-.00053	.00036
951	-5.0	-5.0	3.4	11.9	.195	.780	.00747	-.00067	.00046
952	-5.0	-6.0	3.5	13.9	.193	.780	.00865	-.00081	.00057
953	.0	-1.4	2.1	1.9	.197	.781	.00205	.00011	.00013
954	.0	-2.2	2.4	4.0	.197	.781	.00351	.00007	.00015
955	.0	-3.0	2.6	5.9	.196	.780	.00488	.00003	.00018
957	.0	-3.9	3.0	7.9	.196	.780	.00617	-.00002	.00024
958	.0	-4.7	3.2	9.9	.195	.780	.00742	-.00006	.00031
959	.0	-5.6	3.5	11.9	.196	.780	.00861	-.00010	.00040

Table 7. Continued

(e) Concluded

RUN	37								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
960	.0	-6.0	3.6	12.9	.196	.780	.00916	-.00013	.00045
961	.0	-1.7	3.0	3.9	.248	.813	.00327	.00008	.00014
962	.0	-2.7	3.5	5.9	.249	.814	.00464	.00003	.00017
963	.0	-3.7	3.9	7.9	.249	.814	.00598	-.00002	.00022
964	.0	-4.7	4.4	9.9	.249	.814	.00720	-.00008	.00029
965	.0	-5.7	4.9	11.9	.248	.814	.00835	-.00014	.00038
966	.0	-6.3	5.0	13.0	.248	.813	.00891	-.00018	.00043
967	-7.5	-1.7	3.0	5.9	.247	.813	.00255	-.00023	.00021
968	-7.5	-2.7	3.5	7.9	.248	.814	.00385	-.00044	.00028
969	-7.5	-3.6	3.9	9.9	.247	.814	.00510	-.00064	.00036
970	-7.5	-4.6	4.3	11.9	.247	.813	.00631	-.00084	.00046
971	-7.5	-5.7	4.7	13.9	.247	.814	.00745	-.00105	.00057
RUN	38								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
975	-7.5	-1.5	3.0	6.0	.247	.812	.00251	-.00021	.00020
977	-7.5	-1.5	3.0	6.0	.248	.812	.00253	-.00021	.00020
978	-7.5	-2.5	3.4	8.0	.248	.812	.00380	-.00042	.00027
979	-7.5	-3.4	3.9	10.0	.249	.812	.00505	-.00061	.00035
980	-7.5	-4.4	4.3	12.0	.249	.812	.00625	-.00082	.00045
981	-7.5	-5.5	4.7	14.0	.248	.812	.00740	-.00103	.00056
982	-8.0	-2.1	3.9	8.0	.298	.845	.00304	-.00028	.00026
983	-8.0	-3.1	4.6	10.0	.298	.845	.00422	-.00050	.00034
984	-8.0	-4.1	5.0	12.0	.299	.844	.00540	-.00071	.00044
987	-8.0	-5.3	5.5	14.1	.299	.844	.00657	-.00092	.00056
988	-8.0	-5.3	5.5	14.1	.298	.843	.00657	-.00092	.00056
989	-8.0	-5.9	5.8	15.1	.299	.843	.00710	-.00103	.00063
990	.0	-1.1	3.5	4.1	.300	.843	.00295	.00015	.00016
991	-.1	-2.1	4.1	6.0	.300	.843	.00424	.00009	.00018
992	-.1	-3.1	4.8	8.0	.300	.843	.00551	.00001	.00023
993	-.1	-4.4	5.4	10.0	.301	.842	.00669	-.00008	.00029
994	-.1	-5.4	5.9	12.1	.301	.842	.00782	-.00015	.00037
995	-.1	-6.8	6.3	14.1	.300	.842	.00878	-.00025	.00048
996	-5.0	-.8	4.2	6.1	.350	.875	.00220	.00003	.00021
997	-5.0	-1.9	4.8	8.0	.351	.875	.00340	-.00013	.00027
999	-5.0	-3.1	5.5	10.0	.350	.877	.00449	-.00029	.00034
1000	-5.0	-4.3	6.0	12.0	.351	.878	.00564	-.00045	.00043
1001	-5.0	-5.7	6.5	14.0	.350	.878	.00664	-.00062	.00054
1002	-5.0	-6.4	6.8	15.0	.351	.878	.00716	-.00071	.00060
1003	-7.9	-2.0	5.5	10.1	.397	.909	.00287	-.00014	.00032
1004	-8.0	-3.3	6.0	12.1	.398	.910	.00399	-.00037	.00043
1005	-8.0	-4.7	6.6	14.0	.398	.910	.00493	-.00058	.00054
1007	-8.0	-5.4	6.9	15.1	.398	.910	.00547	-.00069	.00061

Table 7. Continued

(f) $\rho = 0.009$ slug/ft^3; $M_T = 0.65$; $\gamma = 17.93$

RUN	15								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
290	-1.6	-3.6	1.8	11.6	.145	.750	.00645	-.00016	.00030
291	-1.8	-3.6	1.8	12.1	.145	.750	.00675	-.00017	.00032
292	-1.8	-3.6	1.8	13.1	.144	.751	.00734	-.00016	.00036
293	-1.8	-4.3	1.8	13.5	.144	.751	.00754	-.00022	.00039
294	-1.8	-4.6	1.9	13.9	.144	.750	.00774	-.00025	.00041
295	-1.8	-3.1	1.8	10.0	.144	.751	.00549	-.00015	.00026
296	-1.8	-2.3	1.8	8.1	.147	.753	.00424	-.00009	.00020
297	-1.8	-1.5	1.8	6.0	.147	.754	.00289	-.00002	.00016
298	-3.3	-1.3	2.3	7.1	.197	.785	.00318	-.00006	.00018
299	-3.3	-1.6	2.5	8.0	.199	.788	.00377	-.00012	.00020
300	-3.3	-2.6	2.7	10.1	.198	.789	.00511	-.00023	.00025
301	-2.8	-3.6	2.8	12.0	.197	.787	.00644	-.00030	.00032
302	-3.3	-3.6	2.9	12.1	.197	.787	.00632	-.00034	.00032
303	-3.3	-4.5	3.2	14.0	.196	.786	.00746	-.00046	.00040
304	-3.3	-4.6	3.2	14.5	.197	.786	.00776	-.00048	.00043
305	-5.2	-1.0	3.0	8.1	.248	.820	.00298	-.00011	.00021
306	-5.2	-2.0	3.2	10.0	.248	.821	.00424	-.00026	.00026
307	-5.2	-2.5	3.5	11.1	.249	.819	.00485	-.00034	.00029
308	-5.2	-2.9	3.7	12.1	.249	.821	.00548	-.00042	.00033
309	-4.0	-3.7	4.1	13.3	.250	.821	.00647	-.00043	.00036
311	-5.2	-4.0	4.1	14.0	.247	.820	.00656	-.00058	.00041
312	-5.2	-4.5	4.2	15.0	.247	.818	.00711	-.00065	.00045
313	-5.2	-4.8	4.2	15.7	.248	.820	.00750	-.00069	.00048
314	-6.2	-2.4	4.2	12.1	.299	.851	.00463	-.00037	.00034
315	-6.2	-3.0	4.5	13.0	.299	.853	.00510	-.00045	.00037
317	-5.8	-4.2	5.0	15.0	.299	.851	.00630	-.00062	.00046
RUN	16								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
321	-9.1	-.9	4.5	12.0	.345	.884	.00305	-.00023	.00033
322	-9.1	-1.5	4.8	13.0	.347	.883	.00358	-.00035	.00038
323	-9.1	-2.2	5.0	14.0	.346	.882	.00413	-.00047	.00043
324	-9.1	-2.8	5.3	15.0	.346	.884	.00465	-.00059	.00047
325	-9.1	-3.5	5.5	16.0	.346	.883	.00517	-.00071	.00053
326	-9.1	-3.9	5.6	16.5	.348	.882	.00545	-.00077	.00056
327	-11.7	-.2	4.9	13.0	.395	.913	.00211	-.00006	.00031
328	-11.7	-.9	5.2	14.0	.395	.913	.00262	-.00021	.00037
329	-11.7	-1.6	5.5	14.9	.395	.913	.00306	-.00034	.00042
330	-11.8	-2.3	5.7	16.0	.396	.912	.00361	-.00049	.00048
331	-11.8	-2.9	6.0	17.0	.398	.910	.00408	-.00062	.00054

Table 7. Concluded

(f) Concluded

RUN	35								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
870	.1	-1.2	1.3	2.1	.146	.748	.00169	.00009	.00013
871	.1	-1.9	1.4	4.0	.144	.747	.00297	.00007	.00014
872	.1	-2.6	1.4	6.0	.143	.746	.00429	.00005	.00017
873	.1	-3.3	1.4	8.1	.141	.749	.00560	.00005	.00023
874	.1	-4.0	1.6	10.0	.145	.752	.00676	.00003	.00029
875	.1	-4.3	1.6	11.0	.144	.751	.00739	.00003	.00033
876	.1	-4.7	1.6	12.0	.144	.750	.00789	.00002	.00038
877	.0	-4.7	1.7	12.0	.146	.752	.00786	.00001	.00038
878	-5.0	-1.4	1.4	4.0	.145	.752	.00226	-.00011	.00016
879	-5.0	-2.1	1.5	6.1	.145	.752	.00355	-.00024	.00020
880	-5.0	-2.8	1.5	8.0	.144	.751	.00475	-.00036	.00026
881	-5.0	-3.4	1.6	10.0	.143	.750	.00596	-.00047	.00034
882	-5.0	-4.2	1.7	12.0	.142	.750	.00711	-.00058	.00042
883	-5.0	-4.6	1.6	13.0	.145	.752	.00762	-.00064	.00047
884	-5.0	-2.0	1.5	6.0	.146	.752	.00352	-.00023	.00020
885	-5.0	-.7	1.9	4.0	.196	.785	.00199	-.00003	.00016
886	-5.0	-1.6	2.2	6.0	.196	.785	.00332	-.00017	.00020
887	-5.0	-2.4	2.4	8.0	.196	.785	.00457	-.00031	.00025
888	-5.0	-3.3	2.6	9.9	.195	.784	.00579	-.00045	.00032
889	-5.0	-4.1	2.8	12.0	.195	.784	.00698	-.00058	.00041
890	-5.0	-4.6	2.9	13.1	.196	.785	.00754	-.00065	.00045
891	-5.0	-5.1	3.0	14.0	.196	.784	.00806	-.00072	.00050
892	.0	-1.2	2.0	4.0	.197	.786	.00308	.00011	.00014
894	.0	-2.0	2.2	6.0	.197	.785	.00444	.00008	.00017
895	.0	-2.9	2.4	8.0	.196	.785	.00573	.00004	.00021
896	.0	-3.8	2.6	9.9	.196	.785	.00693	.00001	.00027
897	.0	-4.3	2.7	11.0	.196	.785	.00752	.00000	.00030
898	.0	-4.6	2.9	12.0	.197	.785	.00808	-.00002	.00034
899	.0	-.3	1.7	2.0	.198	.786	.00173	.00013	.00013
900	.0	-.5	2.3	4.0	.248	.819	.00295	.00015	.00015
901	.0	-1.5	2.8	6.0	.249	.819	.00433	.00010	.00017
902	.0	-2.4	3.2	8.0	.247	.818	.00561	.00006	.00020
903	.0	-3.5	3.6	9.9	.247	.819	.00677	.00002	.00025
904	.0	-4.0	3.8	11.0	.247	.818	.00736	-.00001	.00028
905	.0	-4.0	3.8	11.0	.247	.818	.00737	-.00001	.00028
906	.0	-4.5	4.0	12.0	.247	.818	.00790	-.00004	.00032
907	-7.5	-.7	2.5	6.0	.245	.818	.00232	-.00016	.00019
908	-7.5	-1.6	2.9	8.0	.245	.818	.00357	-.00036	.00025
909	-7.5	-2.6	3.3	10.0	.245	.818	.00477	-.00054	.00032
910	-7.5	-3.6	3.6	12.0	.245	.818	.00593	-.00073	.00041
911	-7.5	-4.7	3.9	14.0	.246	.818	.00704	-.00092	.00051
912	-6.2	-3.4	4.5	11.9	.296	.852	.00563	-.00052	.00040
913	-6.2	-4.0	4.7	13.0	.297	.851	.00619	-.00061	.00044
914	-6.2	-4.6	4.9	14.0	.298	.851	.00671	-.00070	.00049

Table 8. Rotor Performance Data for Baseline Stiff Blade Set With $I_b = 0.5602$ slug-ft^2

(a) $\rho = 0.006$ slug/ft^3; $M_T = 0.628$; $\gamma = 9.35$

RUN	53								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1439	.0	-1.7	1.3	4.0	.153	.725	.00321	.00004	.00014
1440	.0	-2.4	1.7	6.0	.152	.724	.00474	.00004	.00018
1441	.0	-3.0	2.0	8.0	.152	.724	.00626	.00003	.00024
1442	.0	-3.7	2.4	10.0	.152	.724	.00771	.00002	.00033
1443	.0	-4.3	2.9	12.0	.152	.724	.00904	.00001	.00043
1444	.0	-5.0	3.3	13.9	.152	.725	.01029	-.00002	.00057
1445	.0	-5.4	3.5	15.0	.152	.724	.01092	-.00003	.00065
1446	-1.9	-3.6	2.4	9.9	.150	.725	.00729	-.00021	.00034
1447	-1.9	-4.2	2.9	12.0	.153	.726	.00868	-.00027	.00045
1448	-1.9	-4.8	3.3	14.0	.153	.726	.00992	-.00033	.00058
1449	-1.9	-5.2	3.5	15.0	.149	.723	.01052	-.00037	.00067
1450	-1.9	-2.9	2.0	8.0	.153	.726	.00590	-.00015	.00025
1451	-1.9	-2.3	1.6	6.0	.152	.725	.00439	-.00010	.00019
1452	-1.9	-1.8	1.2	4.0	.153	.726	.00288	-.00004	.00014
1453	.0	-.7	2.4	4.0	.304	.821	.00306	.00013	.00011
1454	.0	-1.5	3.4	5.9	.304	.821	.00452	.00010	.00014
1455	.0	-2.4	4.2	7.9	.305	.821	.00601	.00007	.00019
1456	.0	-3.2	5.1	9.9	.303	.820	.00740	.00004	.00025
1457	.0	-4.2	6.0	11.9	.304	.820	.00867	-.00001	.00035
1458	.0	-5.2	7.0	14.0	.305	.820	.00978	-.00010	.00051
1459	-6.2	-.9	2.7	6.0	.302	.820	.00231	-.00010	.00017
1460	-6.2	-1.7	3.6	8.0	.303	.820	.00373	-.00028	.00024
1461	-6.2	-2.5	4.5	10.0	.301	.819	.00513	-.00045	.00033
1462	-6.2	-3.4	5.3	12.0	.302	.820	.00653	-.00062	.00044
1463	-6.2	-4.4	6.2	14.0	.302	.820	.00780	-.00079	.00056
1464	-6.2	-5.4	7.0	16.0	.302	.820	.00899	-.00097	.00072
1465	-6.2	-6.7	7.8	18.0	.302	.820	.00986	-.00118	.00097
1466	-5.0	-3.2	6.1	11.9	.353	.852	.00629	-.00041	.00042
1467	-5.0	-4.2	7.0	14.0	.352	.851	.00759	-.00056	.00055
1468	-5.0	-5.5	7.9	16.0	.352	.850	.00866	-.00072	.00071
1469	-5.0	-6.1	8.4	17.0	.353	.850	.00914	-.00081	.00083
1470	-5.0	-2.3	5.1	9.9	.353	.851	.00501	-.00026	.00032
1471	-5.0	-1.4	4.1	7.9	.352	.851	.00363	-.00011	.00023
1472	-5.0	-.4	3.1	5.9	.353	.851	.00229	.00003	.00017
1473	-9.2	-.8	3.5	8.0	.349	.851	.00205	-.00008	.00022
1474	-9.2	-1.7	4.5	10.0	.350	.851	.00343	-.00034	.00032
1475	-9.2	-2.6	5.4	12.0	.351	.851	.00475	-.00057	.00044
1476	-9.2	-3.5	6.3	13.9	.352	.852	.00602	-.00080	.00057
1477	-9.3	-4.6	7.2	16.0	.351	.851	.00732	-.00104	.00073
1478	-9.2	-5.2	7.6	17.0	.352	.851	.00794	-.00115	.00082
1480	-6.2	-5.5	7.0	15.9	.303	.819	.00894	-.00093	.00072
1481	-6.2	-3.5	5.3	11.9	.303	.819	.00649	-.00058	.00044
1482	-6.2	-2.6	4.5	9.9	.303	.819	.00509	-.00041	.00034
1483	-6.2	-1.7	3.6	7.9	.303	.819	.00370	-.00024	.00025

Table 8. Continued

(b) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.35$

RUN	52								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1380	.0	-2.3	1.7	6.0	.151	.749	.00456	.00009	.00019
1383	.0	-3.6	2.5	10.0	.149	.747	.00768	.00008	.00034
1384	.0	-4.2	3.0	12.0	.150	.748	.00905	.00007	.00045
1385	.0	-4.9	3.5	14.0	.151	.748	.01045	.00004	.00060
1386	.0	-5.4	3.7	15.0	.151	.748	.01105	.00002	.00069
1387	.0	-5.9	4.0	16.0	.151	.748	.01159	-.00002	.00080
1388	.0	-3.0	2.0	8.0	.152	.749	.00637	.00010	.00027
1389	.0	-1.8	1.2	4.0	.153	.750	.00327	.00011	.00016
1390	-1.8	-1.6	1.2	4.0	.154	.750	.00289	.00003	.00017
1391	-1.8	-2.2	1.6	6.0	.153	.750	.00445	-.00002	.00022
1392	-1.8	-2.9	2.0	8.0	.152	.749	.00597	-.00007	.00028
1393	-1.8	-3.5	2.4	10.0	.149	.747	.00745	-.00012	.00037
1394	-1.8	-4.2	3.0	12.0	.152	.749	.00881	-.00019	.00048
1395	-1.8	-4.9	3.4	14.0	.152	.749	.01010	-.00026	.00062
1396	-1.8	-5.6	4.0	16.0	.152	.748	.01122	-.00035	.00081
1397	-5.0	-3.7	2.9	12.0	.152	.750	.00816	-.00059	.00051
1398	-5.0	-4.4	3.4	14.0	.151	.748	.00952	-.00072	.00065
1399	-5.0	-5.1	3.8	16.0	.151	.748	.01068	-.00086	.00083
1400	-5.0	-3.0	2.5	10.0	.152	.749	.00677	-.00044	.00040
1401	-5.0	-2.4	2.1	8.0	.155	.751	.00528	-.00032	.00031
1402	-5.0	-1.7	1.7	6.0	.154	.750	.00379	-.00018	.00024
1403	-5.0	-1.3	1.3	4.0	.155	.751	.00224	-.00005	.00019
1404	.0	-.1	2.5	4.0	.303	.852	.00302	.00019	.00015
1405	.0	-1.2	3.4	6.0	.304	.852	.00452	.00016	.00017
1406	.1	-2.1	4.2	8.0	.305	.852	.00603	.00013	.00022
1407	.0	-3.1	5.1	10.0	.305	.851	.00742	.00009	.00029
1408	.1	-4.0	6.1	12.0	.304	.852	.00867	.00004	.00038
1409	.1	-5.0	7.1	14.0	.303	.851	.00975	-.00005	.00054
1410	.1	-6.2	8.1	15.0	.303	.851	.01052	-.00018	.00077
1411	-6.2	-3.2	5.3	12.0	.302	.851	.00648	-.00056	.00046
1412	-6.2	-4.2	6.2	14.0	.303	.850	.00783	-.00074	.00058
1413	-6.2	-5.2	7.1	16.0	.303	.851	.00898	-.00092	.00075
1414	-6.2	-5.9	7.4	17.0	.303	.850	.00948	-.00102	.00087
1415	-6.2	-2.3	4.5	10.0	.303	.851	.00511	-.00040	.00035
1416	-6.2	-1.4	3.6	8.0	.302	.851	.00372	-.00022	.00027
1417	-6.2	-.6	2.7	6.0	.302	.851	.00229	-.00004	.00020
1418	-8.0	-1.3	3.4	8.0	.302	.850	.00306	-.00024	.00027
1419	-8.0	-2.1	4.1	10.0	.303	.851	.00448	-.00046	.00036
1420	-8.1	-3.0	5.0	12.0	.303	.851	.00586	-.00068	.00047
1421	-8.1	-3.9	5.9	14.0	.302	.851	.00720	-.00090	.00060
1422	-8.1	-4.9	6.8	16.0	.302	.851	.00845	-.00111	.00076
1423	-8.1	-5.6	7.2	17.0	.302	.850	.00896	-.00122	.00086
1424	-9.2	-2.4	5.4	12.0	.350	.883	.00472	-.00054	.00046

Table 8. Concluded

(b) Concluded

RUN	52								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1425	-9.2	-3.3	6.4	14.0	.351	.883	.00603	-.00078	.00060
1426	-9.2	-4.5	7.2	16.0	.350	.881	.00730	-.00102	.00076
1427	-9.2	-5.1	7.6	17.0	.350	.880	.00795	-.00113	.00085
1428	-9.1	-1.4	4.4	10.0	.350	.883	.00341	-.00029	.00034
1429	-9.1	-.5	3.4	8.0	.349	.881	.00203	-.00003	.00023
1430	-5.0	-.1	3.1	6.0	.353	.881	.00228	.00007	.00019
1431	-5.0	-1.0	4.2	8.0	.352	.881	.00360	-.00008	.00025
1432	-5.0	-1.8	5.3	10.0	.354	.882	.00496	-.00023	.00033
1433	-5.0	-2.8	6.3	12.0	.354	.882	.00628	-.00038	.00044
1434	-5.0	-4.0	7.1	14.0	.355	.883	.00752	-.00054	.00056
1435	-5.0	-5.3	8.0	16.0	.354	.880	.00861	-.00069	.00073

Table 9. Rotor Performance Data for Baseline Stiff Blade Set With $I_b = 0.7092$ slug-ft^2

(a) $\rho = 0.0076$ slug/ft^3; $M_T = 0.628$; $\gamma = 9.35$

RUN	112								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3220	.0	-.9	.0	2.1	.150	.724	.00189	.00008	.00010
3221	.0	-1.5	.4	4.0	.152	.726	.00336	.00007	.00011
3222	.0	-2.1	.8	6.0	.151	.725	.00483	.00007	.00015
3223	.0	-2.9	1.1	8.0	.149	.724	.00622	.00006	.00020
3226	.0	-3.5	1.5	10.0	.150	.724	.00761	.00007	.00028
3227	.0	-4.2	2.0	12.0	.149	.724	.00892	.00004	.00037
3228	.0	-4.5	2.2	13.0	.149	.724	.00949	.00002	.00043
3229	-1.8	-4.3	2.2	13.0	.150	.724	.00912	-.00025	.00045
3230	-1.8	-4.0	2.0	12.0	.151	.725	.00850	-.00022	.00039
3231	-1.8	-3.3	1.6	10.0	.151	.725	.00723	-.00017	.00030
3232	-1.8	-2.7	1.1	8.0	.153	.726	.00589	-.00012	.00022
3233	-1.8	-2.0	.7	6.0	.151	.726	.00448	-.00007	.00016
3234	-1.8	-1.4	.4	4.0	.153	.726	.00306	-.00002	.00013
3235	.0	-.6	1.7	4.0	.302	.820	.00330	.00015	.00009
3236	.1	-1.4	2.6	6.0	.301	.820	.00469	.00012	.00011
3237	.1	-2.3	3.5	8.0	.302	.820	.00604	.00010	.00015
3238	.1	-3.2	4.4	10.0	.301	.819	.00732	.00006	.00021
3239	.1	-4.1	5.2	12.0	.301	.818	.00851	.00001	.00030
3240	.1	-4.6	5.7	13.0	.299	.818	.00902	-.00003	.00036
3241	-6.2	-3.3	4.5	12.0	.298	.819	.00637	-.00059	.00039
3242	-6.2	-4.3	5.3	14.0	.298	.818	.00760	-.00075	.00050
3243	-6.2	-4.7	5.7	15.0	.298	.817	.00817	-.00083	.00057
3244	-6.2	-5.3	6.1	16.0	.299	.818	.00870	-.00092	.00064
3245	-6.2	-2.3	3.7	10.0	.300	.819	.00510	-.00042	.00030
3246	-6.2	-1.5	2.8	8.0	.298	.818	.00380	-.00026	.00023
3247	-6.2	-.6	2.0	6.0	.299	.819	.00249	-.00010	.00017
3248	-5.0	-.3	2.4	6.0	.349	.850	.00247	.00001	.00016
3249	-5.0	-1.2	3.4	8.0	.350	.850	.00377	-.00013	.00021
3254	-5.0	-2.6	4.8	11.0	.349	.849	.00558	-.00032	.00032
3255	-5.0	-3.2	5.3	12.0	.350	.850	.00620	-.00039	.00037
3256	-5.0	-3.7	5.8	13.0	.349	.850	.00677	-.00046	.00042
3257	-5.0	-4.3	6.2	14.0	.350	.849	.00735	-.00053	.00048
3258	-9.2	-3.5	5.4	14.0	.347	.849	.00585	-.00078	.00051
3259	-9.2	-4.5	6.2	16.0	.346	.849	.00705	-.00101	.00065
3260	-9.2	-2.5	4.6	12.0	.345	.848	.00464	-.00056	.00039
3261	-9.2	-1.5	3.6	10.0	.345	.848	.00345	-.00033	.00029
3262	-9.2	-.6	2.7	8.0	.346	.849	.00217	-.00011	.00020

Table 9. Continued

(b) $\rho = 0.0076$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.35$

RUN	110								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3154	-1.8	-1.9	.7	6.0	.150	.748	.00428	-.00006	.00017
3155	-1.8	-2.6	1.2	7.9	.150	.748	.00568	-.00012	.00022
3156	-1.8	-3.2	1.6	9.9	.148	.746	.00708	-.00017	.00030
3157	-1.8	-3.8	2.0	12.0	.150	.747	.00845	-.00022	.00039
3158	-1.8	-4.2	2.3	13.0	.149	.746	.00911	-.00025	.00045
3159	-1.8	-3.2	1.6	9.9	.151	.748	.00722	-.00016	.00030
3160	-1.8	-2.5	1.1	8.0	.151	.748	.00585	-.00011	.00022
3161	-1.8	-1.9	.8	6.0	.153	.749	.00447	-.00006	.00017
3162	-5.0	-1.6	.8	6.0	.150	.747	.00376	-.00024	.00019
3163	-5.0	-2.3	1.1	8.0	.149	.747	.00513	-.00036	.00025
3164	-5.0	-2.9	1.5	10.0	.147	.746	.00651	-.00048	.00033
3165	-5.0	-3.6	1.9	12.0	.149	.746	.00783	-.00061	.00043
3166	-5.0	-3.9	2.2	13.0	.151	.747	.00847	-.00069	.00049
3167	-5.0	-4.3	2.3	14.0	.149	.746	.00910	-.00074	.00055
3168	-5.0	-3.5	1.9	12.0	.148	.746	.00787	-.00061	.00043
3169	-5.0	-2.9	1.5	10.0	.150	.747	.00654	-.00048	.00034
3170	-5.0	-2.3	1.1	8.0	.150	.747	.00513	-.00036	.00025
3171	.0	-2.1	.7	6.0	.150	.746	.00484	.00009	.00016
3172	.0	-2.8	1.1	8.0	.150	.746	.00621	.00007	.00021
3173	.0	-3.4	1.5	10.0	.150	.746	.00762	.00006	.00029
3174	.0	-4.1	1.9	12.0	.149	.748	.00887	.00005	.00039
3175	.0	-4.4	2.1	13.0	.149	.748	.00949	.00004	.00044
3176	.0	-4.1	1.9	12.0	.148	.747	.00887	.00004	.00038
3177	.0	-3.5	1.4	10.0	.150	.748	.00759	.00006	.00029
3178	.0	-2.8	1.1	8.0	.150	.748	.00624	.00007	.00021
3179	.0	-2.1	.7	6.0	.151	.749	.00482	.00007	.00015

RUN	111								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3183	-6.2	-1.8	3.2	8.9	.299	.846	.00436	-.00032	.00026
3184	-6.2	-2.7	4.0	10.9	.299	.846	.00567	-.00048	.00035
3185	-6.2	-3.6	4.9	12.9	.298	.845	.00697	-.00065	.00045
3186	-6.2	-4.6	5.7	14.9	.298	.845	.00811	-.00081	.00057
3187	-6.2	-5.1	6.1	15.9	.298	.845	.00868	-.00090	.00066
3188	-8.0	-4.8	5.9	15.9	.297	.845	.00815	-.00106	.00067
3189	-8.0	-4.8	5.9	15.9	.298	.843	.00817	-.00106	.00067
3190	-8.0	-5.4	6.2	16.9	.298	.841	.00867	-.00114	.00075
3191	-8.0	-3.7	5.0	13.9	.298	.845	.00699	-.00083	.00054
3192	-8.0	-2.8	4.2	11.9	.297	.844	.00573	-.00063	.00042
3193	-8.0	-2.0	3.4	9.9	.298	.845	.00446	-.00043	.00033
3194	.0	-3.1	4.3	10.0	.301	.845	.00730	.00011	.00023
3195	.0	-4.0	5.3	11.9	.300	.843	.00849	.00005	.00032
3196	.0	-4.4	5.7	12.9	.300	.843	.00903	.00001	.00039

Table 9. Concluded

(b) Concluded

RUN	111								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3197	.0	-5.0	6.2	13.9	.300	.843	.00947	-.00006	.00046
3198	.0	-3.1	4.3	9.9	.301	.844	.00731	.00008	.00023
3199	.0	-2.1	3.4	7.9	.301	.844	.00600	.00011	.00016
3200	-5.0	-1.9	4.4	9.9	.351	.876	.00497	-.00024	.00029
3201	-5.0	-2.9	5.3	11.9	.350	.876	.00618	-.00038	.00038
3202	-5.0	-4.0	6.3	13.9	.349	.875	.00734	-.00052	.00049
3203	-5.0	-5.1	7.2	15.9	.350	.875	.00832	-.00066	.00064
3204	-5.0	-5.7	7.6	16.9	.351	.871	.00874	-.00073	.00075
3205	-5.0	-2.9	5.2	11.9	.349	.875	.00618	-.00036	.00038
3206	-5.0	-4.0	6.2	13.9	.350	.875	.00732	-.00051	.00049
3207	-5.0	-2.0	4.3	9.9	.350	.875	.00499	-.00024	.00029
3208	-9.2	-1.4	3.5	9.9	.346	.874	.00341	-.00032	.00030
3209	-9.2	-2.3	4.5	11.9	.346	.874	.00459	-.00054	.00040
3210	-9.2	-3.3	5.4	13.9	.347	.874	.00582	-.00077	.00052
3211	-9.2	-4.3	6.3	15.9	.346	.874	.00702	-.00100	.00066
3212	-9.2	-4.8	6.7	16.9	.348	.873	.00756	-.00110	.00074
3213	-9.2	-3.3	5.4	13.9	.346	.874	.00586	-.00078	.00052
3214	-9.2	-2.3	4.5	11.9	.347	.874	.00460	-.00054	.00040

Table 10. Rotor Performance Data for Baseline Elastic Blade Set
With $I_b = 0.5602$ slug-ft^2

(a) $\rho = 0.006$ slug/ft^3; $M_T = 0.628$; $\gamma = 9.3$

RUN	69	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
2013	.0	.0	2.0	.00083	.00011
2014	.1	.0	6.0	.00275	.00021
2015	.1	.1	8.0	.00393	.00028
2016	.1	.1	9.9	.00521	.00038
2018	.1	.0	12.0	.00655	.00051
2019	.1	.0	12.5	.00692	.00055
2020	.1	.0	12.8	.00711	.00057
2021	.0	.0	14.1	.00799	.00068
2022	.1	.0	15.3	.00881	.00078
2023	.1	.0	15.3	.00887	.00081
2024	.1	.0	16.4	.00960	.00091
2025	.2	.1	17.5	.01036	.00105
2026	.1	.0	18.2	.01071	.00114
2027	.1	.1	15.0	.00865	.00078
2028	.2	.1	12.0	.00662	.00053
2029	.1	.1	9.9	.00529	.00040
2030	.1	.1	8.0	.00401	.00030
2031	.1	.1	6.0	.00281	.00021

RUN	61								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1745	.0	-2.4	1.7	6.0	.150	.724	.00499	.00005	.00016
1746	.0	-3.2	2.1	8.0	.149	.724	.00644	.00003	.00022
1747	.0	-3.9	2.4	10.0	.150	.725	.00787	.00003	.00031
1748	.0	-4.6	2.8	12.0	.152	.725	.00918	.00001	.00042
1749	.0	-5.4	3.3	14.0	.149	.724	.01034	-.00003	.00057
1750	.1	-5.7	3.7	15.0	.149	.724	.01082	-.00006	.00066
1751	.1	-6.2	4.0	16.0	.151	.725	.01123	-.00009	.00075
1752	-1.8	-4.4	2.8	12.0	.149	.724	.00879	-.00025	.00044
1753	-1.8	-5.2	3.3	14.0	.151	.725	.00997	-.00034	.00059
1754	-1.8	-6.1	3.9	16.0	.151	.725	.01088	-.00043	.00077
1755	-1.8	-3.7	2.4	10.0	.150	.725	.00746	-.00020	.00033
1756	-1.8	-3.1	2.1	8.0	.151	.725	.00611	-.00015	.00025
1757	-1.8	-2.4	1.6	6.0	.151	.725	.00469	-.00010	.00018
1758	-1.8	-1.8	1.3	4.0	.152	.726	.00319	-.00005	.00013
1759	.1	-1.2	2.9	4.0	.303	.821	.00329	.00010	.00008
1760	.1	-2.0	3.7	6.0	.304	.821	.00475	.00007	.00012
1761	.1	-2.8	4.7	7.9	.305	.821	.00611	.00003	.00017
1762	.1	-3.7	5.6	10.0	.305	.821	.00743	-.00001	.00025
1763	.0	-4.5	6.5	12.0	.305	.821	.00859	-.00008	.00035
1764	.0	-5.6	7.5	14.0	.306	.821	.00946	-.00018	.00052

Table 10. Continued

(a) Continued

RUN	61								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1765	-6.2	-2.0	3.9	8.0	.304	.821	.00380	-.00032	.00023
1766	-6.2	-2.9	4.8	10.0	.303	.820	.00514	-.00050	.00032
1769	-6.2	-3.8	5.8	12.0	.303	.820	.00643	-.00068	.00043
1770	-6.2	-4.7	6.6	14.0	.304	.820	.00768	-.00085	.00055
1771	-6.2	-5.2	7.0	15.0	.304	.820	.00823	-.00094	.00064
1772	-6.2	-5.7	7.5	16.0	.304	.819	.00871	-.00102	.00073
1773	-5.0	-3.5	6.8	12.0	.355	.854	.00620	-.00050	.00041
1774	-5.0	-4.5	7.8	14.0	.356	.852	.00733	-.00064	.00054
1775	-5.0	-5.5	8.8	16.0	.354	.854	.00825	-.00079	.00072
1776	-5.0	-2.6	5.7	9.9	.354	.853	.00502	-.00035	.00031
1777	-5.0	-1.7	4.7	7.9	.353	.853	.00368	-.00020	.00022
1778	-9.2	-2.0	4.9	9.9	.350	.853	.00336	-.00040	.00031
1779	-9.2	-2.9	5.9	12.0	.351	.853	.00469	-.00063	.00043
1780	-9.2	-3.8	6.8	14.0	.352	.854	.00594	-.00088	.00057
1781	-9.2	-4.8	7.7	16.0	.351	.853	.00711	-.00111	.00073
1782	-9.2	-5.4	8.2	17.0	.351	.853	.00763	-.00123	.00083
RUN	62								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1786	-1.4	-3.4	2.3	9.1	.154	.727	.00696	-.00015	.00029
1787	-1.4	-3.4	2.3	9.1	.154	.727	.00696	-.00015	.00029
1788	-1.3	-3.5	2.3	9.4	.151	.725	.00715	-.00014	.00030
1789	-1.3	-3.5	2.3	9.4	.153	.727	.00715	-.00015	.00030
1790	-1.2	-3.9	2.5	10.5	.152	.726	.00792	-.00015	.00035
1791	-1.2	-3.9	2.6	10.6	.153	.727	.00800	-.00016	.00036
1792	-1.2	-3.9	2.6	10.6	.154	.727	.00800	-.00016	.00036
1793	-1.0	-4.4	2.8	11.8	.152	.725	.00885	-.00016	.00043
1794	-1.0	-4.4	2.8	11.8	.151	.724	.00885	-.00016	.00043
1795	-1.0	-4.5	2.8	12.0	.152	.726	.00897	-.00016	.00044
1796	-1.0	-4.5	2.8	12.0	.151	.725	.00895	-.00016	.00044
1797	-.8	-4.9	3.1	13.1	.151	.724	.00972	-.00016	.00052
1798	-.8	-4.9	3.1	13.1	.150	.724	.00972	-.00015	.00052
1799	-.6	-5.5	3.6	14.6	.154	.726	.01052	-.00017	.00063
1800	-.5	-5.5	3.6	14.6	.152	.725	.01054	-.00016	.00063
1801	.0	-6.5	4.3	16.6	.153	.727	.01137	-.00015	.00084
1802	-2.6	-3.4	3.4	9.6	.204	.759	.00694	-.00028	.00031
1803	-2.6	-3.4	3.4	9.6	.205	.759	.00695	-.00027	.00031
1804	-2.6	-3.4	3.4	9.6	.204	.758	.00697	-.00027	.00031
1805	-2.8	-3.5	3.5	9.8	.203	.758	.00720	-.00028	.00032
1806	-2.5	-3.5	3.5	9.9	.204	.758	.00721	-.00027	.00032
1807	-2.1	-4.0	3.7	10.9	.203	.758	.00805	-.00027	.00036
1810	-2.1	-4.0	3.7	10.9	.203	.757	.00803	-.00027	.00036

Table 10. Continued

(a) Continued

RUN	63								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1814	-2.6	-3.5	3.4	9.6	.202	.758	.00694	-.00029	.00030
1815	-2.5	-3.6	3.5	9.9	.203	.758	.00719	-.00029	.00031
1816	-2.1	-4.1	3.8	10.9	.203	.757	.00803	-.00029	.00035
1817	-1.7	-4.4	4.2	12.1	.203	.757	.00886	-.00027	.00041
1820	-1.7	-4.5	4.2	12.3	.203	.757	.00901	-.00027	.00042
1821	-1.7	-4.5	4.2	12.3	.202	.757	.00901	-.00027	.00042
1822	-1.4	-5.1	4.6	13.3	.203	.758	.00966	-.00028	.00049
1823	-1.4	-5.0	4.6	13.3	.203	.757	.00966	-.00028	.00049
1824	-.9	-5.8	5.3	14.8	.202	.757	.01049	-.00029	.00062
1825	-.9	-5.8	5.3	14.8	.203	.758	.01047	-.00029	.00062
1826	-.6	-6.3	5.8	15.8	.203	.757	.01087	-.00030	.00072
1827	-.6	-6.3	5.8	15.8	.203	.756	.01087	-.00030	.00072
RUN	64								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1831	-3.7	-3.5	4.5	10.5	.254	.790	.00694	-.00041	.00033
1832	-3.7	-3.5	4.5	10.5	.255	.791	.00692	-.00041	.00033
1833	-3.7	-3.6	4.6	10.7	.253	.790	.00710	-.00042	.00034
1834	-3.7	-3.6	4.5	10.7	.253	.790	.00713	-.00041	.00034
1835	-3.7	-3.6	4.5	10.7	.253	.790	.00715	-.00041	.00034
1836	-3.2	-4.2	5.1	11.8	.253	.790	.00800	-.00042	.00040
1837	-3.2	-4.2	5.0	11.8	.254	.790	.00800	-.00042	.00040
1838	-2.8	-1.5	6.2	12.2	.253	.790	.00867	-.00021	.00040
1839	-2.8	-1.5	6.3	12.2	.253	.790	.00867	-.00021	.00040
1840	-2.6	-4.7	5.6	12.9	.254	.789	.00882	-.00040	.00046
1841	-2.6	-4.7	5.6	12.9	.252	.789	.00881	-.00040	.00046
1842	-2.6	-4.8	5.7	13.2	.253	.790	.00897	-.00042	.00048
1843	-2.5	-4.8	5.7	13.2	.252	.789	.00897	-.00041	.00048
1844	-2.0	-5.5	6.3	14.3	.253	.790	.00963	-.00042	.00058
1847	-1.2	-6.4	7.2	15.7	.254	.789	.01013	-.00042	.00073
1848	-1.2	-6.3	7.2	15.7	.254	.789	.01011	-.00041	.00073
1849	-4.8	-3.9	5.6	11.9	.284	.809	.00715	-.00053	.00042
1850	-4.8	-3.9	5.6	9.9	.283	.808	.00537	-.00047	.00033
1851	-4.8	-3.8	5.6	10.9	.283	.808	.00632	-.00052	.00038
1852	-4.8	-3.9	5.5	11.9	.283	.808	.00716	-.00054	.00042
1853	-4.8	-3.9	5.5	12.9	.282	.809	.00799	-.00055	.00047
1854	-4.8	-3.8	5.6	13.9	.285	.809	.00873	-.00052	.00053
1855	-4.8	-5.8	5.6	11.9	.285	.809	.00664	-.00068	.00044
1856	-4.8	-4.9	5.6	11.9	.283	.808	.00690	-.00061	.00042
1857	-4.8	-3.9	5.6	11.9	.283	.809	.00714	-.00054	.00041
1858	-4.8	-2.9	5.6	11.8	.283	.808	.00737	-.00047	.00040
1859	-4.8	-1.9	5.6	11.9	.283	.808	.00763	-.00040	.00040
1860	-4.8	-3.8	3.6	11.9	.283	.808	.00771	-.00041	.00039
1861	-4.8	-3.9	4.6	11.9	.283	.808	.00742	-.00048	.00040
1862	-4.8	-3.8	5.6	11.9	.284	.809	.00712	-.00056	.00041
1863	-4.8	-3.9	6.6	11.9	.283	.808	.00687	-.00062	.00042
1864	-4.8	-3.9	7.6	11.8	.283	.809	.00654	-.00068	.00043
1865	-4.8	-3.9	7.6	11.8	.283	.809	.00653	-.00068	.00043

Table 10. Continued

(a) Continued

RUN	65								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1870	-4.9	-3.9	5.5	12.0	.282	.807	.00730	-.00056	.00043
1871	-4.4	-4.0	5.5	12.8	.283	.806	.00814	-.00051	.00047
1872	-4.4	-4.0	5.5	12.8	.283	.806	.00812	-.00050	.00047
1873	-4.4	-3.9	5.6	10.8	.282	.808	.00641	-.00049	.00037
1874	-4.4	-3.9	5.6	11.8	.283	.808	.00730	-.00050	.00042
1875	-4.4	-3.9	5.5	12.8	.282	.808	.00813	-.00049	.00047
1876	-4.4	-3.9	5.6	13.8	.282	.807	.00891	-.00048	.00054
1877	-4.4	-3.9	5.5	14.8	.282	.807	.00953	-.00044	.00063
1878	-4.5	-6.0	5.6	12.8	.284	.807	.00767	-.00068	.00050
1879	-4.4	-5.0	5.6	12.8	.282	.807	.00789	-.00059	.00049
1883	-4.4	-2.0	5.6	12.9	.283	.808	.00859	-.00031	.00047
1884	-4.4	-4.0	7.5	12.8	.284	.807	.00757	-.00064	.00050
1885	-4.4	-4.0	6.6	12.8	.284	.808	.00783	-.00057	.00049
1886	-4.4	-4.0	5.6	12.8	.283	.808	.00810	-.00050	.00048
1887	-4.4	-4.0	4.6	12.8	.283	.808	.00838	-.00042	.00047
1888	-4.4	-4.0	3.6	12.8	.283	.808	.00865	-.00034	.00046
1889	-8.1	-1.6	3.1	13.3	.282	.807	.00838	-.00054	.00051
1890	-8.1	-1.6	3.1	13.3	.281	.807	.00838	-.00054	.00051
1891	-3.9	-4.8	6.2	14.1	.284	.807	.00897	-.00053	.00057
1892	-3.9	-4.8	6.2	14.1	.284	.807	.00897	-.00053	.00057
1893	-3.9	-4.7	6.2	12.1	.284	.807	.00737	-.00055	.00045
1894	-3.9	-4.7	6.2	13.1	.285	.808	.00818	-.00056	.00050
1895	-3.9	-4.7	6.2	14.1	.282	.807	.00898	-.00054	.00057
1896	-3.9	-4.7	6.2	15.1	.283	.807	.00954	-.00052	.00067
1897	-3.9	-4.7	6.2	16.1	.283	.806	.00999	-.00046	.00077
1899	-3.9	-5.7	6.2	14.1	.284	.807	.00869	-.00065	.00057
1900	-3.9	-4.8	6.2	14.1	.283	.806	.00892	-.00055	.00057
1901	-3.9	-3.8	6.2	14.1	.283	.806	.00914	-.00044	.00056
1902	-3.9	-2.8	6.2	14.1	.284	.807	.00934	-.00034	.00056
1903	-3.9	-4.8	8.2	14.0	.284	.806	.00839	-.00072	.00058
1904	-3.9	-4.8	7.2	14.0	.283	.806	.00861	-.00064	.00057
1905	-3.9	-4.8	6.2	14.1	.284	.807	.00891	-.00055	.00056
1906	-3.9	-4.8	5.2	14.2	.284	.807	.00916	-.00047	.00056
1907	-3.9	-4.8	4.2	14.2	.284	.806	.00942	-.00038	.00055
1908	-2.0	-6.4	7.7	16.0	.283	.806	.00988	-.00054	.00077
1911	-5.3	-4.1	6.1	12.6	.303	.820	.00717	-.00064	.00047
1912	-5.2	-4.2	6.2	12.8	.302	.820	.00733	-.00064	.00048
1913	-5.2	-4.3	6.2	12.8	.304	.821	.00735	-.00064	.00048
1914	-4.4	-4.9	6.7	13.8	.303	.820	.00812	-.00066	.00054
1915	-4.4	-4.9	6.7	13.8	.303	.820	.00811	-.00066	.00054
1916	-9.8	-1.6	3.2	14.2	.300	.818	.00820	-.00076	.00057
1919	-9.8	-1.6	3.2	14.2	.299	.819	.00819	-.00076	.00057

Table 10. Continued

(a) Continued

RUN	66								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1923	-5.1	-4.0	6.0	12.4	.304	.822	.00704	-.00060	.00044
1924	-5.1	-4.0	6.0	12.4	.304	.822	.00704	-.00059	.00044
1925	-5.0	-4.1	6.1	12.6	.305	.822	.00726	-.00060	.00045
1926	-4.9	-4.1	6.1	12.6	.304	.821	.00726	-.00060	.00045
1927	-5.0	-4.1	6.1	12.6	.305	.822	.00727	-.00060	.00045
1928	-4.2	-4.8	6.7	13.8	.304	.820	.00817	-.00061	.00052
1929	-4.2	-4.8	6.7	13.8	.305	.820	.00816	-.00061	.00052
1930	-9.8	-1.6	3.2	14.3	.302	.820	.00821	-.00076	.00057
1931	-9.8	-1.6	3.2	14.3	.302	.820	.00821	-.00076	.00057
1932	-3.3	-5.6	7.3	14.8	.305	.819	.00896	-.00061	.00062
1933	-3.3	-5.6	7.3	14.8	.306	.820	.00896	-.00062	.00062
1934	-3.1	-5.8	7.5	15.1	.305	.819	.00911	-.00062	.00065
1935	-3.1	-5.8	7.5	15.1	.305	.819	.00911	-.00062	.00065
1936	-1.8	-7.1	8.7	17.0	.305	.819	.00983	-.00060	.00089
1937	-1.8	-7.1	8.7	17.0	.305	.817	.00982	-.00060	.00088
1938	-7.4	-4.6	7.4	14.7	.353	.852	.00695	-.00083	.00063
1939	-7.4	-4.6	7.4	14.7	.353	.851	.00698	-.00084	.00063
1940	-7.4	-4.6	7.5	12.7	.353	.852	.00514	-.00069	.00049
1941	-7.4	-4.6	7.5	13.7	.353	.852	.00608	-.00077	.00056
1942	-7.4	-4.6	7.5	14.7	.354	.853	.00697	-.00083	.00063
1943	-7.4	-4.6	7.5	15.7	.354	.853	.00775	-.00086	.00071
1944	-7.3	-4.6	7.4	16.7	.353	.852	.00839	-.00086	.00080
1945	-7.4	-6.6	7.5	14.7	.353	.852	.00636	-.00094	.00064
1946	-7.4	-6.6	7.5	14.7	.353	.852	.00637	-.00094	.00064
1947	-7.4	-6.6	7.5	14.7	.353	.852	.00637	-.00094	.00064
1948	-7.4	-5.6	7.4	14.7	.352	.851	.00669	-.00089	.00063
1949	-7.4	-5.6	7.4	14.7	.353	.852	.00670	-.00089	.00063
1950	-7.4	-4.6	7.4	14.7	.353	.852	.00698	-.00084	.00063
1951	-7.3	-3.6	7.4	14.7	.352	.851	.00727	-.00077	.00062
1952	-7.3	-2.6	7.4	14.8	.352	.850	.00755	-.00070	.00062
1953	-7.4	-4.6	9.5	14.7	.352	.850	.00636	-.00092	.00063
1956	-7.4	-4.6	8.5	14.7	.353	.851	.00667	-.00089	.00063
1957	-7.4	-4.6	7.4	14.7	.353	.851	.00697	-.00084	.00063
1958	-7.4	-4.6	6.4	14.8	.353	.851	.00729	-.00080	.00062
1961	-7.3	-4.6	5.5	14.8	.353	.851	.00760	-.00075	.00062

Table 10. Continued

(a) Concluded

RUN	67								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1965	-6.6	-4.6	7.6	14.6	.354	.853	.00721	-.00080	.00060
1966	-6.6	-4.6	7.6	14.6	.353	.852	.00719	-.00080	.00060
1967	-6.6	-4.6	7.6	12.6	.352	.852	.00542	-.00069	.00046
1968	-6.6	-4.7	7.6	13.6	.354	.853	.00632	-.00076	.00053
1969	-6.6	-4.6	7.6	14.6	.354	.853	.00718	-.00080	.00059
1970	-6.6	-4.7	7.5	15.6	.353	.853	.00794	-.00081	.00067
1971	-6.6	-4.7	7.5	16.6	.354	.852	.00853	-.00081	.00077
1972	-6.6	-6.6	7.6	14.6	.353	.852	.00661	-.00093	.00060
1973	-6.6	-5.6	7.6	14.6	.353	.852	.00693	-.00087	.00060
1974	-6.6	-4.6	7.6	14.6	.353	.852	.00719	-.00080	.00059
1975	-6.6	-3.7	7.6	14.6	.353	.852	.00746	-.00073	.00059
1976	-6.6	-2.7	7.6	14.6	.354	.852	.00769	-.00066	.00058
1977	-6.6	-4.7	9.6	14.6	.353	.852	.00657	-.00091	.00060
1978	-6.6	-4.7	8.6	14.6	.354	.852	.00687	-.00086	.00060
1979	-6.6	-4.6	7.6	14.6	.353	.852	.00717	-.00081	.00059
1980	-6.6	-4.7	6.6	14.6	.353	.852	.00745	-.00076	.00058
1981	-6.6	-4.7	6.6	14.6	.353	.852	.00748	-.00076	.00058
1982	-6.6	-4.6	5.6	14.6	.355	.854	.00779	-.00069	.00058
1983	-5.7	-5.5	8.5	16.0	.353	.853	.00805	-.00086	.00071
1984	-5.7	-5.5	8.5	16.0	.352	.853	.00805	-.00087	.00071
1985	-4.2	-6.7	9.7	17.8	.354	.850	.00890	-.00085	.00094
RUN	68								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1989	-7.8	-4.8	8.3	15.8	.373	.869	.00702	-.00090	.00068
1990	-7.8	-4.8	8.3	13.8	.374	.870	.00525	-.00075	.00053
1991	-7.8	-4.8	8.3	14.8	.374	.869	.00614	-.00083	.00061
1992	-7.8	-4.9	8.3	15.8	.374	.869	.00701	-.00088	.00068
1993	-7.8	-4.9	8.3	16.8	.375	.870	.00783	-.00091	.00078
1994	-7.8	-4.9	8.3	17.8	.375	.870	.00835	-.00092	.00089
1995	-7.8	-6.8	8.4	15.8	.374	.869	.00640	-.00098	.00069
1996	-7.8	-5.8	8.4	15.8	.374	.869	.00673	-.00093	.00069
1997	-7.8	-4.8	8.4	15.8	.373	.869	.00705	-.00087	.00069
1998	-7.8	-3.8	8.4	15.7	.373	.869	.00729	-.00079	.00068
1999	-7.8	-2.8	8.4	15.7	.374	.870	.00754	-.00072	.00068
2000	-7.8	-4.8	6.4	15.8	.374	.870	.00763	-.00075	.00068
2001	-7.8	-4.8	7.4	15.7	.374	.870	.00732	-.00081	.00068
2002	-7.8	-4.8	8.4	15.8	.374	.870	.00699	-.00087	.00068
2003	-7.8	-4.8	9.4	15.7	.373	.870	.00667	-.00091	.00068
2004	-7.8	-4.8	10.4	15.7	.374	.871	.00635	-.00095	.00069
2005	-7.2	-5.8	9.1	17.2	.374	.870	.00792	-.00097	.00082
2006	-7.2	-5.7	9.1	17.2	.374	.870	.00790	-.00097	.00082
2007	-6.1	-6.5	9.8	18.2	.384	.856	.00841	-.00095	.00094
2008	-10.4	-5.3	9.1	18.0	.399	.887	.00686	-.00112	.00088
2009	-10.4	-4.9	8.7	17.1	.403	.880	.00654	-.00107	.00082

Table 10. Continued

(b) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.3$

RUN	58								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1616	-1.7	-3.0	2.5	8.3	.149	.748	.00650	-.00016	.00028
1617	-1.7	-2.8	2.7	8.3	.148	.748	.00650	-.00016	.00028
1618	-2.5	-2.9	3.6	8.6	.203	.783	.00651	-.00025	.00028
1619	-2.5	-2.9	3.6	8.6	.204	.784	.00651	-.00024	.00028
1620	-4.2	-2.9	4.6	9.7	.250	.814	.00648	-.00041	.00034
1621	-4.2	-2.9	4.6	9.7	.251	.815	.00648	-.00041	.00034
1622	-5.0	-3.0	5.5	10.7	.280	.833	.00659	-.00051	.00039
1623	-5.0	-2.9	5.5	10.7	.282	.833	.00661	-.00051	.00039
1624	-5.0	-3.0	5.5	8.7	.282	.835	.00470	-.00042	.00031
1625	-5.0	-2.8	5.6	9.7	.282	.834	.00563	-.00048	.00035
1626	-5.0	-2.9	5.5	10.7	.283	.833	.00655	-.00051	.00039
1627	-5.0	-2.8	5.5	11.7	.282	.834	.00744	-.00053	.00043
1628	-5.0	-2.9	5.5	12.7	.282	.834	.00831	-.00053	.00049
1629	-5.0	-5.0	5.5	10.7	.281	.834	.00618	-.00063	.00041
1630	-5.0	-4.0	5.4	10.8	.281	.835	.00642	-.00058	.00040
1631	-5.0	-3.0	5.5	10.8	.281	.835	.00662	-.00052	.00039
1632	-5.0	-2.0	5.5	10.8	.281	.835	.00687	-.00046	.00038
1633	-5.0	-1.0	5.5	10.8	.280	.834	.00715	-.00040	.00038
1635	-5.0	-2.9	7.5	10.7	.281	.835	.00602	-.00063	.00041
1636	-5.0	-3.0	6.5	10.8	.280	.834	.00636	-.00059	.00040
1637	-5.0	-3.0	5.5	10.8	.281	.835	.00667	-.00053	.00039
1638	-5.0	-3.0	4.5	10.8	.281	.834	.00703	-.00047	.00038
1639	-5.0	-3.0	3.5	10.8	.281	.834	.00734	-.00039	.00037
1640	-5.9	-2.7	6.2	11.4	.300	.847	.00647	-.00062	.00043
1641	-5.9	-2.7	6.2	11.4	.301	.846	.00649	-.00062	.00043
1642	-8.0	-3.0	7.7	13.8	.351	.880	.00652	-.00082	.00060
1643	-7.9	-3.0	7.7	13.8	.352	.881	.00650	-.00082	.00060
1644	-5.9	-2.9	6.1	11.4	.302	.846	.00645	-.00061	.00043
1645	-5.1	-2.9	5.5	10.7	.282	.833	.00657	-.00053	.00038
1646	-4.2	-2.9	4.6	9.7	.252	.814	.00648	-.00044	.00033
1647	-2.5	-2.8	3.6	8.6	.203	.781	.00651	-.00026	.00028
1648	-1.7	-2.8	2.6	8.4	.151	.747	.00660	-.00015	.00028

Table 10. Continued

(b) Continued

RUN	59								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1653	-7.9	-3.1	7.7	11.7	.350	.881	.00455	-.00062	.00044
1654	-7.9	-3.0	7.7	12.8	.350	.880	.00551	-.00072	.00051
1655	-7.9	-3.0	7.7	13.8	.351	.881	.00645	-.00080	.00059
1656	-7.9	-3.0	7.7	14.7	.351	.879	.00732	-.00085	.00066
1657	-7.9	-3.1	7.7	15.7	.350	.881	.00804	-.00087	.00076
1658	-8.0	-5.1	7.6	13.7	.351	.880	.00597	-.00089	.00059
1659	-7.9	-4.1	7.6	13.7	.350	.881	.00623	-.00084	.00059
1660	-7.9	-3.2	7.6	13.8	.350	.881	.00648	-.00080	.00059
1661	-7.9	-2.1	7.6	13.8	.351	.880	.00676	-.00074	.00059
1662	-7.9	-1.2	7.6	13.8	.351	.880	.00700	-.00068	.00058
1663	-8.0	-3.2	9.6	13.7	.350	.880	.00579	-.00084	.00059
1664	-7.9	-3.2	8.6	13.7	.351	.879	.00613	-.00081	.00059
1665	-7.9	-3.1	7.6	13.8	.351	.879	.00649	-.00077	.00059
1667	-7.9	-3.1	6.6	13.8	.351	.879	.00685	-.00072	.00059
1668	-7.9	-3.1	5.6	13.8	.351	.879	.00719	-.00067	.00058
1669	-9.5	-3.5	8.2	15.3	.374	.893	.00650	-.00090	.00071
1670	-9.4	-3.5	8.2	15.3	.374	.893	.00648	-.00090	.00071
1671	-9.4	-3.4	8.2	13.3	.374	.894	.00469	-.00070	.00053
1672	-9.4	-3.5	8.2	14.4	.374	.892	.00560	-.00082	.00062
1673	-9.5	-3.4	8.2	15.3	.375	.893	.00650	-.00091	.00071
1674	-9.4	-3.5	8.1	16.3	.375	.892	.00737	-.00098	.00080
1675	-9.5	-5.5	8.2	15.3	.374	.893	.00591	-.00098	.00070
1676	-9.5	-4.5	8.2	15.3	.375	.891	.00619	-.00095	.00070
1677	-9.4	-3.5	8.2	15.3	.377	.888	.00644	-.00089	.00070
1678	-9.4	-2.5	8.2	15.3	.376	.891	.00673	-.00084	.00071
1679	-9.4	-1.5	8.2	15.3	.374	.891	.00702	-.00079	.00072
1680	-9.5	-3.5	10.2	15.3	.373	.892	.00576	-.00095	.00071
1681	-9.5	-3.5	9.2	15.3	.375	.892	.00610	-.00093	.00071
1682	-9.5	-3.5	8.1	15.3	.374	.891	.00647	-.00091	.00071
1683	-9.4	-3.5	7.2	15.3	.374	.892	.00679	-.00087	.00071
1684	-9.4	-3.5	6.2	15.3	.375	.892	.00716	-.00083	.00071

Table 10. Concluded

(b) Concluded

RUN	60								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1692	.0	-1.8	1.2	4.0	.152	.751	.00308	.00005	.00012
1693	.0	-2.4	1.8	6.0	.150	.749	.00459	.00005	.00015
1694	.0	-3.0	2.2	8.0	.151	.750	.00613	.00004	.00022
1695	.0	-3.7	2.6	10.0	.150	.747	.00761	.00003	.00030
1696	.0	-4.4	3.0	12.0	.148	.747	.00901	.00002	.00042
1697	-.1	-5.3	3.4	14.0	.148	.746	.01032	-.00002	.00058
1698	-1.8	-4.3	2.8	12.0	.149	.748	.00875	-.00023	.00045
1699	-1.8	-5.1	3.4	14.0	.149	.747	.00995	-.00032	.00060
1700	-1.8	-3.7	2.5	10.0	.149	.747	.00744	-.00019	.00034
1701	-1.8	-3.1	2.0	8.0	.149	.747	.00601	-.00014	.00025
1702	-1.8	-2.4	1.6	6.0	.151	.748	.00454	-.00008	.00018
1703	-1.8	-1.8	1.2	4.0	.153	.750	.00305	-.00003	.00014
1704	-5.0	-1.5	1.2	4.0	.153	.750	.00236	-.00013	.00015
1705	-5.0	-2.1	1.6	6.0	.152	.749	.00386	-.00026	.00020
1706	-5.0	-2.7	2.0	8.0	.150	.748	.00531	-.00038	.00028
1707	-5.0	-3.3	2.4	10.0	.148	.746	.00671	-.00051	.00037
1708	-5.0	-4.0	2.6	12.0	.149	.747	.00814	-.00063	.00048
1709	-5.0	-4.8	3.1	14.0	.149	.746	.00939	-.00077	.00063
1710	.0	-.9	2.7	4.0	.303	.848	.00313	.00015	.00010
1711	.1	-1.6	3.7	6.0	.304	.849	.00459	.00011	.00014
1712	.1	-2.4	4.8	8.0	.304	.849	.00600	.00007	.00019
1713	.1	-3.2	5.7	10.0	.303	.848	.00733	.00003	.00026
1714	.1	-4.0	6.7	12.0	.303	.848	.00850	-.00004	.00037
1715	.1	-5.0	7.8	14.0	.304	.848	.00932	-.00014	.00055
1716	-6.2	-1.6	4.0	8.0	.302	.848	.00365	-.00027	.00024
1717	-6.2	-2.5	4.9	9.9	.302	.848	.00504	-.00046	.00033
1718	-6.2	-3.3	5.8	12.0	.303	.848	.00640	-.00064	.00044
1719	-6.2	-4.1	6.8	14.0	.302	.847	.00767	-.00082	.00057
1720	-6.2	-4.8	7.2	15.0	.302	.847	.00826	-.00091	.00066
1721	-6.2	-5.5	7.6	16.0	.303	.848	.00867	-.00101	.00076
1722	-8.0	-4.0	6.5	14.1	.301	.847	.00723	-.00097	.00060
1723	-8.0	-4.4	7.0	15.0	.302	.848	.00773	-.00106	.00067
1724	-8.0	-4.8	7.4	16.0	.301	.847	.00827	-.00116	.00076
1725	-8.0	-3.0	5.6	12.0	.302	.848	.00593	-.00072	.00046
1726	-8.0	-2.1	4.7	10.0	.302	.848	.00459	-.00051	.00035
1727	-8.0	-1.3	3.8	8.0	.302	.848	.00318	-.00030	.00025
1728	-5.0	-1.4	4.8	8.0	.353	.880	.00363	-.00016	.00023
1729	-5.0	-2.3	5.7	10.0	.353	.878	.00499	-.00031	.00032
1730	-5.0	-3.3	6.9	12.0	.353	.878	.00620	-.00047	.00043
1731	-5.0	-4.3	7.9	14.0	.354	.879	.00733	-.00063	.00057
1732	-5.0	-4.7	8.4	15.0	.352	.878	.00779	-.00070	.00065
1733	-9.2	-1.7	5.0	10.0	.350	.878	.00330	-.00036	.00031
1734	-9.2	-2.6	6.0	12.0	.351	.878	.00463	-.00061	.00044
1735	-9.2	-3.6	6.9	14.0	.350	.878	.00592	-.00085	.00058
1736	-9.2	-4.0	7.4	15.0	.350	.878	.00651	-.00096	.00066
1737	-9.2	-4.5	7.9	16.0	.350	.877	.00709	-.00108	.00074
1738	-10.6	-4.6	8.8	17.4	.399	.914	.00649	-.00109	.00084

Table 11. Rotor Performance Data for Advanced Stiff Blade Set With $I_b = 0.4186$ slug-ft^2

(a) $\rho = 0.0023$ slug/ft^3 (atmospheric air); $M_T = 0.284$; $\gamma = 5.89$

RUN	18	HOVER	(AIR)		
POINT	A_1	B_1	θ	C_T	C_Q
348	-.1	.0	4.0	.00256	.00022
349	-.1	.0	6.0	.00390	.00030
350	.0	.0	8.0	.00540	.00043
351	.0	.0	10.0	.00694	.00058
352	.0	.0	12.0	.00868	.00076
353	.0	-.1	14.0	.01038	.00099
354	.0	-.1	16.0	.01203	.00124
355	-.1	-.1	17.0	.01287	.00140
356	.0	.0	18.0	.01360	.00159
357	-.4	.8	18.0	.01361	.00158
358	-.5	.7	19.0	.01442	.00179
359	-.5	.7	20.0	.01496	.00201
360	-.5	.7	21.0	.01554	.00226
361	-.5	.7	19.0	.01425	.00179
362	-.5	.7	17.0	.01293	.00144
363	-.4	.8	15.0	.01123	.00116
364	-.3	.4	13.0	.00958	.00092
365	-.4	.4	12.0	.00878	.00081
366	-.4	.4	10.0	.00702	.00061
367	-.4	.4	8.0	.00543	.00045
368	-.5	.4	6.0	.00390	.00032
369	-.5	.4	4.0	.00252	.00022

(b) $\rho = 0.00382$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.78$

RUN	19	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
373	.8	.8	1.9	.00167	.00017
374	.8	1.1	4.0	.00291	.00023
375	.8	.9	6.1	.00425	.00033
376	.9	.9	7.9	.00569	.00044
377	.7	.9	10.0	.00722	.00060
378	.6	.9	12.1	.00885	.00079
379	.2	.8	14.0	.01043	.00102
380	.2	.8	16.0	.01198	.00130
382	-.2	.3	7.9	.00567	.00045
383	-.4	.3	3.9	.00278	.00023
384	-.5	.3	8.0	.00575	.00046

Table 11. Continued

(b) Continued

RUN	20								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
388	-1.8	-3.9	1.7	5.6	.150	.755	.00652	-.00017	.00029
389	-1.8	-4.7	2.0	7.9	.148	.754	.00847	-.00025	.00041
390	-1.8	-5.4	2.4	9.9	.148	.753	.01013	-.00033	.00055
391	-1.8	-6.1	2.7	11.9	.151	.756	.01167	-.00044	.00073
392	-1.8	-6.8	3.2	13.9	.150	.754	.01314	-.00057	.00095
393	-1.8	-7.5	3.3	14.9	.150	.754	.01376	-.00064	.00108
394	-1.8	-8.0	3.5	15.9	.150	.754	.01425	-.00071	.00122
395	-1.8	-3.3	1.5	3.9	.150	.756	.00521	-.00010	.00023
396	-1.8	-2.6	1.1	1.9	.153	.757	.00353	-.00004	.00018
397	.0	-2.8	1.1	1.9	.150	.755	.00393	.00006	.00017
398	.0	-3.5	1.4	4.0	.145	.752	.00574	.00006	.00023
399	.0	-4.2	1.7	5.9	.146	.753	.00743	.00005	.00031
400	.0	-4.9	2.0	7.9	.148	.754	.00916	.00004	.00042
401	.0	-5.6	2.4	9.9	.150	.755	.01072	.00001	.00056
402	.0	-6.3	2.7	11.9	.151	.753	.01228	-.00004	.00074
403	.0	-7.2	3.2	13.9	.150	.754	.01356	-.00016	.00095
404	.0	-7.7	3.4	14.9	.150	.754	.01415	-.00022	.00109
406	-5.0	-7.5	3.4	15.9	.149	.756	.01369	-.00139	.00125
407	-5.0	-6.5	3.0	13.9	.146	.753	.01244	-.00116	.00099
408	-5.0	-5.7	2.6	11.9	.150	.754	.01107	-.00095	.00079
409	-5.0	-5.0	2.3	9.9	.146	.753	.00955	-.00076	.00061
410	-5.0	-4.4	2.0	7.8	.146	.752	.00786	-.00060	.00047
411	-5.0	-3.6	1.7	5.9	.148	.754	.00617	-.00044	.00035
412	-5.0	-2.9	1.4	3.9	.150	.754	.00457	-.00028	.00027
413	-5.0	-2.2	1.2	1.8	.150	.754	.00277	-.00012	.00020
414	-4.0	-3.7	2.5	6.0	.202	.790	.00655	-.00034	.00034
415	-3.3	-3.8	2.6	5.9	.202	.789	.00670	-.00028	.00033
416	-3.3	-4.7	3.0	7.8	.202	.789	.00845	-.00041	.00043
417	-3.3	-5.4	3.5	9.9	.200	.787	.01014	-.00055	.00056
418	-3.3	-6.2	4.0	12.0	.200	.788	.01171	-.00069	.00073
419	-3.3	-7.3	4.5	13.9	.199	.788	.01294	-.00089	.00093
421	-3.3	-8.6	5.1	15.9	.201	.789	.01398	-.00111	.00121
422	-3.3	-3.1	2.2	3.9	.204	.792	.00487	-.00017	.00024
423	-3.3	-2.3	1.6	1.9	.203	.791	.00311	-.00006	.00019
424	.0	-2.7	1.7	1.9	.203	.789	.00414	.00010	.00017
425	.0	-3.4	2.2	3.9	.201	.789	.00601	.00008	.00022
426	.0	-4.3	2.6	5.9	.202	.790	.00779	.00005	.00028
427	.0	-5.1	3.0	7.9	.201	.789	.00956	.00001	.00038
428	.0	-5.8	3.5	9.8	.202	.790	.01118	-.00004	.00050
429	.0	-6.7	3.9	11.9	.201	.789	.01274	-.00011	.00067
431	.0	-9.0	5.2	15.9	.202	.790	.01479	-.00044	.00118
432	-5.0	-6.2	3.9	11.9	.201	.790	.01106	-.00103	.00073
433	-5.0	-7.0	4.5	13.9	.200	.789	.01252	-.00123	.00094
434	-5.0	-8.3	5.0	15.9	.201	.787	.01366	-.00148	.00123
435	-5.0	-5.1	3.5	9.9	.201	.790	.00952	-.00081	.00057

Table 11. Continued

(b) Continued

RUN	20								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
436	-5.0	-4.4	3.0	7.9	.201	.790	.00782	-.00063	.00044
437	-5.0	-3.6	2.5	5.9	.204	.791	.00612	-.00045	.00033
438	-5.0	-2.8	2.1	3.9	.203	.789	.00435	-.00028	.00025
439	-5.0	-2.0	1.6	1.9	.203	.790	.00257	-.00012	.00019
RUN	27								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
634	-5.2	-2.8	2.4	3.9	.256	.821	.00367	-.00023	.00023
635	-5.2	-3.7	3.1	5.9	.256	.821	.00533	-.00041	.00031
636	-4.5	-4.2	3.4	6.9	.254	.820	.00657	-.00044	.00035
637	-5.2	-4.5	3.7	8.0	.254	.821	.00716	-.00059	.00041
638	-5.2	-5.4	4.3	10.0	.254	.820	.00886	-.00079	.00053
639	-5.2	-6.3	4.9	11.9	.254	.820	.01044	-.00098	.00068
640	-5.2	-7.4	5.5	13.9	.255	.822	.01175	-.00119	.00089
641	-5.2	-8.8	6.3	15.9	.256	.823	.01275	-.00146	.00117
642	-6.2	-6.3	6.0	11.9	.307	.857	.00931	-.00100	.00068
643	-6.2	-7.5	6.6	13.9	.306	.856	.01051	-.00123	.00089
644	-6.2	-8.8	7.4	16.0	.306	.855	.01163	-.00150	.00118
645	-6.2	-5.2	5.2	10.0	.307	.857	.00777	-.00078	.00053
646	-6.7	-4.6	4.7	8.7	.306	.857	.00649	-.00068	.00046
647	-6.2	-3.4	3.6	5.9	.308	.856	.00443	-.00036	.00031
648	-6.2	-2.4	2.8	3.9	.308	.856	.00275	-.00015	.00023
RUN	28								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
653	-7.4	-2.4	2.2	3.9	.255	.821	.00281	-.00026	.00022
654	-7.5	-3.2	3.0	5.9	.257	.822	.00461	-.00051	.00031
655	-7.5	-4.1	3.5	7.9	.257	.822	.00630	-.00075	.00042
656	-7.5	-5.0	4.2	10.0	.255	.821	.00803	-.00102	.00056
657	-7.5	-5.8	4.8	11.9	.254	.820	.00961	-.00126	.00071
658	-7.5	-6.9	5.4	13.9	.255	.821	.01102	-.00154	.00091
659	-7.5	-8.3	6.0	15.9	.253	.821	.01205	-.00181	.00117
660	-6.5	-4.7	4.5	8.6	.306	.856	.00650	-.00065	.00044
661	-6.5	-4.7	4.5	8.6	.307	.856	.00653	-.00065	.00045
662	-8.0	-4.1	4.1	7.9	.306	.855	.00536	-.00064	.00041
663	-8.0	-4.9	4.9	9.9	.306	.856	.00704	-.00090	.00055
664	-8.0	-5.9	5.6	11.9	.306	.855	.00855	-.00117	.00070
665	-8.0	-7.0	6.4	13.9	.307	.855	.00993	-.00144	.00090
666	-8.0	-8.4	7.0	15.9	.306	.855	.01106	-.00171	.00117
667	-8.0	-3.1	3.3	6.0	.306	.855	.00381	-.00038	.00031
668	-8.0	-2.2	2.5	3.9	.308	.856	.00207	-.00012	.00022

Table 11. Continued

(b) Concluded

RUN	22								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
484	-9.2	-3.5	4.5	8.0	.354	.883	.00410	-.00049	.00038
485	-9.2	-4.4	5.5	10.0	.355	.883	.00559	-.00077	.00051
486	-9.2	-5.4	6.4	12.0	.356	.884	.00712	-.00106	.00067
487	-9.2	-6.5	7.2	14.0	.354	.884	.00857	-.00135	.00086
488	-9.2	-8.0	7.8	16.0	.355	.885	.00969	-.00164	.00110
489	-8.7	-5.0	5.8	10.8	.356	.884	.00640	-.00084	.00057
490	-5.1	-5.4	6.0	10.0	.357	.884	.00750	-.00055	.00049
491	-5.1	-6.4	6.9	12.1	.358	.884	.00901	-.00073	.00064
492	-5.1	-7.8	7.8	14.1	.359	.883	.01019	-.00097	.00087
493	-5.1	-8.5	8.0	15.0	.357	.882	.01071	-.00107	.00099
494	-5.1	-9.4	8.3	16.0	.358	.884	.01117	-.00121	.00114
495	-5.1	-4.3	5.0	8.0	.356	.885	.00608	-.00036	.00038
496	-11.8	-3.7	5.5	10.1	.401	.922	.00349	-.00048	.00044
497	-11.8	-4.7	6.4	12.0	.402	.923	.00479	-.00083	.00060
498	-11.8	-5.8	7.3	14.0	.402	.923	.00625	-.00121	.00080
499	-11.8	-7.0	8.0	16.0	.403	.923	.00772	-.00160	.00104
500	-11.8	-8.7	8.5	18.0	.405	.920	.00886	-.00194	.00132
501	-11.2	-6.0	7.2	13.8	.404	.922	.00642	-.00118	.00078
502	-8.1	-6.7	7.5	14.0	.409	.923	.00814	-.00107	.00082
503	-8.1	-8.5	8.5	16.0	.408	.921	.00922	-.00136	.00108
504	-8.1	-9.4	8.6	17.0	.410	.920	.00989	-.00148	.00124
505	-8.1	-5.6	6.8	12.0	.409	.921	.00670	-.00079	.00066
506	-8.1	-4.6	6.0	10.0	.407	.920	.00518	-.00053	.00051

Table 11. Continued

(c) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 15.36$

RUN	23								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
510	.1	-2.8	1.0	2.0	.148	.754	.00318	.00007	.00017
511	.1	-3.5	1.1	4.1	.147	.753	.00477	.00006	.00021
512	.1	-4.2	1.3	6.1	.147	.753	.00630	.00005	.00027
513	.1	-5.0	1.4	8.0	.146	.753	.00779	.00003	.00035
514	.1	-5.7	1.6	10.1	.146	.752	.00931	.00002	.00046
515	.1	-6.4	1.6	12.0	.148	.754	.01064	-.00001	.00059
516	.1	-6.7	1.7	13.0	.151	.755	.01135	-.00003	.00066
517	-1.9	-5.4	1.6	10.0	.148	.754	.00893	-.00027	.00048
518	-1.8	-6.1	1.7	12.0	.148	.754	.01028	-.00034	.00061
519	-1.9	-6.5	1.7	13.0	.148	.754	.01089	-.00038	.00068
520	-1.8	-4.8	1.4	8.0	.146	.753	.00746	-.00020	.00038
521	-1.9	-4.4	1.3	6.7	.150	.755	.00649	-.00016	.00032
522	-1.8	-3.2	1.2	4.0	.148	.754	.00446	-.00007	.00023
523	-1.8	-2.6	1.1	2.0	.151	.753	.00292	-.00001	.00019
524	-5.0	-2.3	1.1	2.1	.147	.753	.00232	-.00010	.00020
525	-5.0	-2.9	1.2	4.0	.146	.752	.00382	-.00025	.00024
526	-5.0	-3.7	1.3	6.1	.147	.755	.00535	-.00039	.00031
527	-5.0	-4.3	1.4	8.0	.146	.754	.00678	-.00052	.00040
528	-5.0	-5.1	1.6	10.0	.147	.755	.00830	-.00067	.00052
529	-5.0	-5.8	1.7	12.0	.149	.755	.00965	-.00082	.00064
530	-5.0	-6.1	1.7	13.0	.148	.755	.01031	-.00088	.00072
531	-5.0	-6.5	1.8	14.0	.148	.755	.01091	-.00096	.00079
532	-5.0	-5.3	2.6	10.0	.199	.787	.00833	-.00065	.00050
533	-5.0	-6.1	2.8	12.1	.200	.788	.00982	-.00081	.00062
535	-5.0	-4.4	2.3	8.1	.199	.789	.00684	-.00047	.00039
536	-5.0	-3.6	2.1	6.0	.200	.789	.00526	-.00031	.00030
537	-5.0	-2.8	1.8	4.0	.202	.791	.00365	-.00016	.00024
538	-5.0	-1.8	1.5	2.0	.202	.791	.00208	.00000	.00019
539	-3.3	-2.1	1.5	2.0	.201	.789	.00253	.00002	.00019
540	-3.3	-2.9	1.8	4.1	.200	.788	.00418	-.00009	.00023
541	-3.3	-4.3	2.2	7.0	.198	.788	.00647	-.00028	.00033
544	-3.3	-4.6	2.3	8.0	.198	.789	.00733	-.00035	.00036
545	-3.3	-5.4	2.6	10.0	.197	.788	.00882	-.00046	.00046
546	-3.3	-6.4	2.8	12.1	.197	.787	.01024	-.00060	.00059
547	-3.3	-6.8	2.9	13.0	.198	.787	.01089	-.00067	.00066
548	.0	-5.9	2.6	10.1	.199	.788	.00987	.00002	.00042
549	.0	-6.8	2.8	12.1	.198	.788	.01125	-.00003	.00053
550	.0	-5.1	2.4	8.0	.200	.790	.00826	.00003	.00032
551	.0	-4.2	2.1	6.0	.200	.789	.00672	.00007	.00024
552	.0	-3.4	1.8	4.0	.200	.789	.00510	.00009	.00019
553	.0	-2.6	1.5	2.1	.202	.790	.00345	.00010	.00016

Table 11. Continued

(c) Continued

RUN	24								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
557	.1	-2.3	2.0	2.0	.251	.822	.00340	.00012	.00015
558	.1	-3.2	2.5	4.0	.249	.822	.00513	.00010	.00017
559	.1	-4.2	2.8	5.9	.250	.823	.00672	.00007	.00021
560	.1	-5.2	3.2	8.0	.252	.823	.00844	.00004	.00028
561	.1	-6.0	3.7	10.0	.252	.823	.00988	.00000	.00036
562	.1	-6.5	3.9	11.0	.251	.823	.01064	-.00001	.00041
563	.1	-7.0	4.0	12.0	.249	.822	.01135	-.00003	.00047
564	-4.2	-4.4	3.1	7.6	.252	.822	.00650	-.00042	.00033
567	-5.2	-4.4	3.2	8.0	.251	.823	.00638	-.00053	.00036
568	-5.2	-5.3	3.6	9.9	.250	.822	.00789	-.00070	.00046
569	-5.2	-6.3	3.9	12.0	.250	.822	.00937	-.00087	.00058
570	-5.2	-7.4	4.2	14.0	.249	.822	.01070	-.00106	.00072
571	-5.2	-7.9	4.3	15.0	.249	.822	.01127	-.00115	.00080
572	-5.2	-3.5	2.8	5.9	.252	.823	.00479	-.00035	.00028
573	-5.2	-2.5	2.3	4.0	.252	.823	.00326	-.00018	.00022
574	-5.2	-1.6	1.8	2.0	.252	.823	.00169	-.00001	.00018
575	-7.5	-2.2	2.2	3.9	.249	.822	.00243	-.00019	.00022
576	-7.5	-3.1	2.6	5.9	.250	.823	.00402	-.00042	.00029
577	-7.5	-4.0	3.1	7.9	.250	.823	.00555	-.00066	.00038
578	-7.5	-4.9	3.5	10.0	.249	.823	.00711	-.00088	.00049
579	-7.5	-5.9	3.9	12.0	.249	.822	.00855	-.00112	.00061
580	-7.5	-7.0	4.1	14.0	.248	.822	.00993	-.00136	.00076

Table 11. Continued

(c) Concluded

RUN	25								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
584	-6.2	-4.1	3.7	8.0	.302	.851	.00541	-.00045	.00037
585	-6.2	-5.2	4.2	10.0	.301	.851	.00679	-.00065	.00046
586	-6.2	-6.2	4.7	12.0	.303	.849	.00825	-.00085	.00058
587	-6.2	-7.2	5.2	14.0	.302	.848	.00959	-.00104	.00071
588	-6.3	-8.8	5.4	16.0	.301	.848	.01071	-.00129	.00091
589	-6.4	-4.8	4.1	9.5	.302	.848	.00640	-.00060	.00045
590	.0	-5.2	4.0	8.0	.304	.847	.00805	.00009	.00027
591	.0	-6.2	4.7	10.0	.304	.846	.00952	.00003	.00035
592	.0	-7.3	5.2	12.0	.303	.847	.01080	-.00006	.00046
593	.0	-8.5	5.6	14.0	.302	.847	.01189	-.00016	.00061
594	.0	-4.1	3.4	6.0	.303	.848	.00656	.00012	.00021
595	.0	-3.0	2.7	4.0	.303	.848	.00494	.00015	.00017
596	-8.0	-2.8	3.1	6.1	.299	.848	.00320	-.00030	.00029
597	-8.1	-3.7	3.6	8.0	.300	.849	.00465	-.00053	.00037
598	-8.1	-4.8	4.1	9.9	.300	.849	.00606	-.00077	.00047
599	-8.1	-5.9	4.7	12.0	.301	.848	.00747	-.00103	.00060
600	-8.1	-6.9	5.1	14.0	.302	.848	.00885	-.00127	.00074
601	-8.1	-8.3	5.3	16.0	.302	.846	.01003	-.00153	.00091

RUN	26								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
609	-9.2	-3.4	4.0	7.8	.353	.883	.00346	-.00037	.00034
610	-9.2	-4.5	4.7	9.8	.352	.882	.00482	-.00063	.00045
611	-9.2	-5.6	5.2	11.8	.351	.883	.00614	-.00089	.00058
612	-9.2	-6.8	5.8	13.8	.351	.883	.00752	-.00117	.00072
613	-9.2	-8.3	6.2	15.8	.352	.883	.00859	-.00144	.00090
614	-8.6	-5.7	5.3	11.8	.353	.882	.00644	-.00085	.00058
615	-5.1	-5.4	5.0	9.8	.356	.883	.00662	-.00046	.00043
616	-5.1	-6.7	5.6	11.9	.355	.882	.00793	-.00065	.00054
617	-5.2	-7.9	6.1	13.9	.355	.882	.00922	-.00084	.00068
618	-5.1	-8.6	6.3	14.9	.354	.882	.00970	-.00095	.00077
619	-5.1	-4.3	4.3	7.8	.355	.882	.00519	-.00030	.00034
620	-11.8	-3.6	4.8	9.8	.400	.916	.00287	-.00033	.00038
621	-11.8	-4.8	5.5	11.8	.401	.917	.00413	-.00066	.00053
622	-11.8	-6.1	6.0	13.8	.399	.916	.00540	-.00100	.00069
625	-10.5	-7.0	6.3	14.5	.403	.915	.00646	-.00110	.00077
626	-8.1	-7.3	6.3	13.9	.406	.916	.00702	-.00092	.00071
627	-8.1	-8.8	6.7	15.8	.407	.915	.00811	-.00115	.00089
628	-8.1	-4.6	5.2	9.8	.405	.915	.00447	-.00041	.00045
629	-8.1	-5.8	5.7	11.8	.404	.915	.00574	-.00064	.00057

Table 11. Continued

(d) $\rho = 0.0076$ slug/ft^3; $M_T = 0.65$; $\gamma = 19.20$

RUN 29

POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
674	.0	-2.5	1.1	2.0	.146	.748	.00300	.00007	.00017
675	.0	-3.3	1.1	4.0	.146	.748	.00448	.00005	.00020
676	.0	-4.1	1.2	5.9	.145	.747	.00596	.00003	.00025
677	.0	-4.8	1.3	7.9	.146	.748	.00734	.00001	.00033
678	.1	-5.5	1.2	9.9	.145	.749	.00872	.00000	.00042
679	.1	-5.8	1.2	10.9	.144	.748	.00935	-.00001	.00047
680	-1.8	-2.4	1.2	1.9	.146	.751	.00268	-.00001	.00017
681	-1.8	-3.1	1.1	4.0	.146	.751	.00420	-.00007	.00021
682	-1.7	-4.3	1.1	7.1	.146	.749	.00650	-.00015	.00031
683	-1.8	-5.4	1.2	10.0	.146	.751	.00841	-.00026	.00044
685	-1.8	-6.0	1.2	12.0	.144	.748	.00971	-.00033	.00056
686	-1.8	-4.6	1.2	7.9	.144	.748	.00704	-.00019	.00035
687	-1.8	-3.9	1.2	6.0	.146	.749	.00568	-.00013	.00027
688	-5.0	-2.8	1.1	3.9	.147	.751	.00358	-.00025	.00023
689	-5.0	-3.5	1.2	5.9	.146	.749	.00503	-.00039	.00029
690	-5.0	-4.3	1.2	7.9	.143	.748	.00643	-.00052	.00037
691	-5.0	-4.9	1.2	9.9	.144	.748	.00782	-.00065	.00047
692	-5.0	-4.9	1.2	10.0	.144	.749	.00783	-.00064	.00047
693	-5.0	-5.6	1.2	11.9	.146	.749	.00907	-.00077	.00058
694	-5.0	-6.0	1.3	12.9	.144	.749	.00966	-.00084	.00064
695	-5.0	-5.2	2.3	9.8	.198	.785	.00777	-.00064	.00045
696	-5.0	-6.1	2.4	12.0	.198	.785	.00913	-.00079	.00056
697	-5.0	-6.5	2.4	12.9	.196	.783	.00979	-.00086	.00062
698	-5.0	-4.3	2.2	7.9	.198	.784	.00640	-.00047	.00036
699	-5.0	-3.4	2.0	5.9	.199	.786	.00489	-.00031	.00028
700	-5.0	-2.5	1.8	3.9	.199	.786	.00340	-.00016	.00023
701	-3.3	-2.7	1.8	3.9	.199	.784	.00384	-.00009	.00022
702	-3.3	-3.6	2.0	5.9	.198	.784	.00537	-.00020	.00027
703	-2.9	-4.3	2.1	7.3	.198	.785	.00650	-.00025	.00031
704	-3.3	-4.5	2.1	8.0	.198	.784	.00687	-.00033	.00034
707	-3.3	-6.2	2.3	12.0	.197	.784	.00961	-.00055	.00054
708	.0	-4.9	2.1	7.9	.198	.784	.00774	.00005	.00030
709	.0	-5.7	2.3	9.9	.197	.784	.00917	.00001	.00038
710	.0	-4.0	1.9	5.9	.199	.786	.00623	.00007	.00023
711	.0	-3.2	1.7	3.9	.200	.786	.00474	.00009	.00019
712	.0	-2.3	1.6	1.9	.199	.786	.00313	.00012	.00017

Table 11. Continued

(d) Continued

RUN	30								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
716	.0	-5.0	2.8	7.9	.249	.818	.00736	.00007	.00027
717	.0	-6.0	3.2	9.9	.248	.817	.00876	.00004	.00035
718	.0	-6.4	3.3	10.9	.249	.816	.00943	.00002	.00038
719	.0	-4.0	2.5	5.9	.250	.817	.00595	.00010	.00022
720	.0	-2.9	2.1	3.9	.251	.818	.00449	.00014	.00019
721	-4.2	-4.6	3.0	8.6	.248	.816	.00644	-.00039	.00036
722	-5.2	-4.1	2.9	8.0	.248	.816	.00566	-.00042	.00035
723	-5.2	-5.2	3.2	9.9	.248	.816	.00698	-.00058	.00043
724	-5.2	-6.1	3.4	11.9	.246	.815	.00829	-.00073	.00053
725	-5.2	-6.7	3.5	12.9	.248	.816	.00891	-.00081	.00058
726	-5.2	-3.1	2.6	5.9	.249	.816	.00422	-.00025	.00027
727	-7.5	-2.7	2.5	5.9	.249	.817	.00350	-.00032	.00028
728	-7.5	-3.8	2.8	8.0	.248	.817	.00494	-.00054	.00036
729	-7.5	-4.7	3.1	9.9	.248	.817	.00622	-.00073	.00045
730	-7.5	-5.8	3.4	11.9	.248	.816	.00751	-.00095	.00056
731	-7.5	-6.8	3.5	13.9	.248	.816	.00876	-.00117	.00067
732	-6.1	-3.9	3.4	7.9	.299	.849	.00478	-.00037	.00034
733	-6.1	-4.9	4.0	9.9	.299	.849	.00605	-.00055	.00043
734	-6.2	-6.2	4.3	11.9	.298	.848	.00730	-.00074	.00053
737	-6.1	-5.2	4.1	10.4	.298	.848	.00634	-.00058	.00045
738	-7.9	-4.6	3.8	9.9	.298	.848	.00539	-.00062	.00044
739	-7.9	-5.8	4.2	11.9	.298	.848	.00672	-.00085	.00055
740	-8.0	-6.9	4.5	13.9	.297	.848	.00790	-.00108	.00067
741	-7.9	-3.5	3.4	7.9	.295	.847	.00410	-.00039	.00035
742	.0	-5.0	3.7	7.9	.299	.847	.00714	.00011	.00024
743	.1	-6.0	4.2	9.9	.299	.847	.00849	.00005	.00031
744	.0	-7.1	4.6	11.9	.299	.847	.00966	-.00003	.00039
745	.1	-3.9	3.1	5.9	.300	.848	.00575	.00012	.00019

Table 11. Continued

(d) Concluded

RUN	31								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
749	-4.9	-2.7	3.5	5.9	.350	.881	.00324	-.00008	.00025
750	-4.9	-4.0	4.1	8.0	.350	.881	.00470	-.00025	.00032
751	-4.9	-5.2	4.7	9.9	.350	.880	.00584	-.00040	.00039
752	-4.9	-6.4	5.2	11.9	.351	.880	.00706	-.00057	.00048
753	-4.9	-7.8	5.6	13.9	.350	.880	.00823	-.00074	.00059
754	-4.9	-8.1	5.6	14.5	.349	.880	.00855	-.00078	.00063
755	-9.2	-3.1	3.7	8.0	.346	.879	.00305	-.00028	.00032
756	-9.2	-4.2	4.4	9.9	.347	.880	.00421	-.00051	.00042
757	-9.2	-5.5	4.9	12.0	.347	.880	.00544	-.00076	.00054
758	-7.7	-6.4	5.1	12.8	.345	.881	.00650	-.00079	.00057
761	-9.2	-6.1	5.0	12.9	.346	.883	.00599	-.00087	.00060
762	-7.9	-3.0	4.2	7.9	.397	.915	.00272	-.00007	.00032
764	-7.9	-4.2	4.9	10.0	.398	.916	.00398	-.00031	.00042
765	-8.0	-5.5	5.5	12.0	.397	.916	.00506	-.00053	.00052
766	-8.0	-7.0	5.9	14.0	.397	.916	.00623	-.00076	.00064
767	-11.7	-3.3	4.6	10.0	.392	.915	.00250	-.00020	.00036
768	-11.7	-4.6	5.2	11.9	.392	.915	.00357	-.00047	.00048
769	-11.7	-6.1	5.7	14.0	.393	.916	.00470	-.00078	.00063

Table 11. Continued

(e) $\rho = 0.009$ slug/ft^3; $M_T = 0.65$; $\gamma = 23.04$

RUN	32								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
773	.0	-2.4	1.1	2.0	.144	.746	.00271	.00008	.00016
774	.0	-3.2	1.1	4.0	.143	.745	.00410	.00006	.00019
775	.0	-4.0	1.1	6.0	.145	.747	.00545	.00004	.00023
776	.0	-4.8	1.1	7.9	.144	.746	.00670	.00001	.00029
777	.1	-5.1	1.1	8.9	.145	.747	.00733	.00001	.00033
778	.1	-5.5	1.1	10.0	.144	.746	.00799	.00000	.00037
779	-1.8	-2.3	1.2	2.0	.146	.748	.00240	.00000	.00017
780	-1.8	-3.0	1.1	4.1	.145	.747	.00381	-.00006	.00020
781	-1.8	-3.8	1.1	6.0	.145	.747	.00512	-.00011	.00024
782	-1.8	-3.0	1.1	4.0	.146	.747	.00381	-.00005	.00020
783	-1.6	-4.5	1.2	8.1	.143	.745	.00651	-.00015	.00031
784	-1.8	-5.3	1.1	10.0	.143	.746	.00760	-.00024	.00039
785	-1.8	-5.7	1.0	10.9	.145	.747	.00817	-.00027	.00043
786	-5.0	-1.9	1.2	2.0	.145	.748	.00189	-.00008	.00018
787	-5.0	-2.6	1.2	4.0	.145	.748	.00322	-.00021	.00021
788	-5.0	-3.5	1.1	5.9	.144	.747	.00446	-.00034	.00026
789	-5.0	-4.2	1.1	8.0	.143	.746	.00581	-.00046	.00033
790	-5.0	-4.9	1.1	9.9	.143	.746	.00703	-.00059	.00041
791	-5.0	-5.3	1.1	11.0	.141	.745	.00762	-.00065	.00046
792	-5.0	-5.7	1.0	11.8	.143	.746	.00812	-.00072	.00051
793	-5.0	-2.4	1.7	3.9	.195	.781	.00297	-.00014	.00021
794	-5.0	-3.2	1.9	6.0	.195	.780	.00439	-.00028	.00026
795	-5.0	-4.2	1.9	8.0	.196	.781	.00570	-.00043	.00032
798	-5.0	-5.1	2.2	10.0	.197	.781	.00698	-.00058	.00040
799	-5.0	-5.4	2.2	11.0	.196	.781	.00765	-.00064	.00045
800	-5.0	-5.9	2.2	11.9	.196	.780	.00814	-.00071	.00049
801	-3.3	-2.6	1.8	4.0	.197	.781	.00343	-.00008	.00020
802	-3.3	-3.5	1.8	6.0	.198	.781	.00484	-.00018	.00025
803	-3.3	-4.4	2.0	8.0	.197	.781	.00618	-.00029	.00031
804	-2.5	-4.6	1.9	8.0	.197	.781	.00640	-.00023	.00030
805	-3.3	-5.3	2.1	9.9	.197	.781	.00740	-.00041	.00038
806	-3.3	-5.7	2.1	11.0	.196	.780	.00805	-.00045	.00042
807	.0	-2.1	1.5	2.0	.198	.781	.00283	.00012	.00016
808	.0	-3.1	1.6	4.0	.197	.781	.00424	.00010	.00018
809	.0	-4.0	1.8	5.9	.196	.780	.00561	.00007	.00022
810	.0	-4.8	2.0	7.9	.196	.780	.00697	.00004	.00027
811	.0	-5.7	2.1	9.9	.196	.780	.00824	.00000	.00034

Table 11. Continued

(e) Continued

RUN	33								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
815	.1	-1.9	1.8	2.1	.247	.814	.00269	.00015	.00016
816	.1	-2.9	2.1	4.1	.249	.815	.00419	.00012	.00017
817	.1	-3.9	2.4	6.0	.248	.815	.00558	.00009	.00019
818	.1	-4.9	2.7	8.0	.248	.815	.00692	.00006	.00024
819	.1	-5.9	2.9	10.0	.248	.815	.00824	.00003	.00029
820	-5.2	-2.1	2.1	4.0	.248	.815	.00252	-.00009	.00021
822	-5.2	-4.0	2.6	8.0	.247	.814	.00528	-.00039	.00031
823	-5.2	-4.0	2.6	8.0	.247	.814	.00528	-.00039	.00031
824	-4.0	-4.9	2.8	9.4	.247	.814	.00650	-.00039	.00035
825	-5.2	-5.0	3.0	10.1	.247	.814	.00658	-.00054	.00039
826	-5.2	-6.2	3.1	12.0	.247	.814	.00774	-.00070	.00048
827	-7.5	-1.8	2.1	4.0	.246	.814	.00188	-.00009	.00021
828	-7.5	-2.6	2.4	6.0	.246	.814	.00324	-.00029	.00026
829	-7.5	-3.7	2.7	8.0	.247	.815	.00455	-.00050	.00033
830	-7.5	-4.7	2.9	10.0	.247	.815	.00579	-.00070	.00041
831	-7.5	-5.8	3.1	12.0	.245	.814	.00701	-.00090	.00050
832	-7.5	-6.3	3.2	13.0	.245	.814	.00759	-.00100	.00056
833	-7.9	-2.2	2.8	6.0	.296	.847	.00248	-.00015	.00025
834	-7.9	-3.4	3.2	8.0	.296	.848	.00380	-.00038	.00032
835	-7.9	-4.5	3.6	10.0	.296	.848	.00504	-.00059	.00041
836	-8.0	-5.8	3.9	12.1	.297	.848	.00620	-.00081	.00050
837	-8.0	-6.2	4.0	13.0	.296	.848	.00682	-.00091	.00055
838	-6.2	-1.6	2.4	4.1	.297	.847	.00183	.00001	.00021
839	-6.2	-2.6	2.8	6.0	.297	.846	.00305	-.00016	.00026
840	-6.2	-3.8	3.2	8.1	.297	.847	.00442	-.00034	.00032
841	-6.2	-4.9	3.6	10.0	.297	.846	.00560	-.00052	.00039
842	-5.7	-5.5	3.8	11.0	.298	.847	.00644	-.00058	.00043
843	-6.2	-6.0	3.9	12.0	.298	.847	.00686	-.00070	.00048
844	-6.2	-6.5	4.1	13.1	.297	.846	.00751	-.00079	.00053

Table 11. Concluded

(e) Concluded

RUN	34								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
850	.0	-3.7	2.9	6.0	.298	.848	.00535	.00013	.00019
851	.0	-4.9	3.5	8.0	.299	.847	.00667	.00007	.00023
852	.0	-5.9	4.0	10.0	.298	.847	.00789	.00003	.00028
853	.0	-6.5	4.2	11.0	.298	.846	.00850	-.00001	.00031
854	-9.2	-2.7	3.7	8.1	.344	.878	.00273	-.00021	.00031
855	-9.2	-3.9	4.2	10.0	.342	.878	.00389	-.00044	.00040
856	-9.2	-5.2	4.6	12.0	.343	.878	.00507	-.00068	.00051
857	-9.2	-6.0	4.8	13.0	.343	.878	.00563	-.00080	.00057
858	-8.4	-6.3	4.8	13.5	.344	.879	.00624	-.00082	.00059
859	-5.0	-3.7	3.8	8.0	.345	.878	.00434	-.00017	.00033
860	-5.0	-5.3	4.4	10.0	.346	.878	.00557	-.00033	.00039
861	-5.0	-6.1	4.9	12.0	.346	.878	.00662	-.00050	.00047
862	-5.0	-7.6	5.2	14.0	.346	.878	.00768	-.00067	.00057
863	-11.8	-2.9	4.7	10.0	.390	.911	.00220	-.00012	.00034
864	-11.8	-4.1	5.1	12.0	.389	.911	.00330	-.00041	.00046
865	-11.8	-5.6	5.5	14.0	.390	.910	.00438	-.00070	.00058

Table 12. Rotor Performance Data for Advanced Stiff Blade Set
With $I_b = 0.6735$ slug-ft^3

(a) $\rho = 0.006$ slug/ft^3; $M_T = 0.628$; $\gamma = 9.55$.

RUN	56								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1551	-5.0	-1.0	2.8	4.1	.353	.882	.00221	.00005	.00019
1552	-5.0	-2.0	3.8	6.1	.352	.881	.00389	-.00011	.00025
1553	-5.0	-2.9	4.8	8.0	.354	.882	.00555	-.00028	.00033
1554	-4.9	-4.0	5.8	10.0	.354	.881	.00705	-.00044	.00044
1555	-5.0	-5.0	6.8	12.0	.353	.881	.00863	-.00060	.00057
1556	-5.0	-6.1	7.8	14.1	.354	.880	.01000	-.00078	.00077
1557	-5.0	-6.7	8.4	15.1	.353	.879	.01056	-.00088	.00089
1558	-9.2	-4.2	6.0	12.1	.352	.881	.00668	-.00087	.00063
1559	-9.2	-5.2	7.0	14.0	.351	.879	.00810	-.00114	.00080
1560	-9.2	-3.1	5.0	10.0	.351	.880	.00507	-.00056	.00048
1561	-9.2	-2.1	4.1	8.0	.350	.880	.00355	-.00028	.00035
1562	-9.2	-1.2	3.0	6.0	.349	.879	.00197	.00001	.00024
1563	-9.2	-2.4	4.1	8.0	.350	.852	.00353	-.00029	.00035
1564	-9.2	-3.3	5.0	10.0	.351	.852	.00510	-.00056	.00048
1565	-9.2	-4.2	6.1	12.1	.350	.852	.00667	-.00084	.00063
1566	-9.2	-5.2	7.0	14.1	.350	.852	.00818	-.00112	.00081
1567	-9.2	-5.8	7.5	15.1	.350	.851	.00883	-.00125	.00090
1568	-5.0	-5.1	6.8	12.0	.353	.852	.00858	-.00056	.00058
1569	-5.0	-6.2	7.8	14.1	.352	.851	.00995	-.00075	.00077
1570	-5.0	-4.0	5.8	10.0	.354	.852	.00711	-.00040	.00045
1571	-5.0	-3.1	4.7	8.0	.352	.852	.00554	-.00024	.00035
1572	-5.0	-2.1	3.7	6.0	.353	.852	.00390	-.00009	.00026
1573	-6.2	-2.3	3.3	6.1	.303	.820	.00396	-.00022	.00028
1574	-6.2	-3.2	4.1	8.1	.303	.820	.00561	-.00041	.00037
1575	-6.2	-4.0	5.0	10.0	.303	.820	.00719	-.00060	.00048
1576	-6.2	-5.0	5.9	12.0	.304	.821	.00876	-.00082	.00062
1577	-6.2	-6.0	6.8	14.1	.302	.819	.01024	-.00103	.00080
1578	.0	-5.1	5.7	10.0	.305	.820	.01007	.00009	.00036
1579	.0	-5.5	6.2	11.1	.305	.820	.01083	.00005	.00044
1580	.0	-4.1	4.7	8.1	.305	.820	.00857	.00014	.00026
1581	.0	-3.3	3.9	6.0	.305	.820	.00680	.00015	.00019
1582	.0	-2.4	2.9	4.1	.304	.820	.00511	.00018	.00014
1583	.0	-1.5	2.0	2.0	.305	.821	.00327	.00018	.00013
1584	.0	-2.2	.9	2.1	.153	.724	.00328	.00009	.00015
1585	.0	-2.9	1.3	4.1	.151	.723	.00508	.00009	.00020
1586	.0	-3.5	1.7	6.1	.151	.723	.00683	.00009	.00027
1587	.0	-4.3	2.1	8.0	.151	.723	.00850	.00008	.00036
1588	.0	-5.0	2.6	10.1	.152	.724	.01015	.00005	.00049
1589	.0	-5.7	3.2	12.1	.153	.725	.01168	.00000	.00064
1590	-1.8	-5.5	3.1	12.0	.152	.724	.01119	-.00034	.00066
1591	-1.8	-4.8	2.6	10.0	.152	.724	.00963	-.00026	.00050
1592	-1.8	-4.1	2.2	8.1	.151	.723	.00805	-.00018	.00038
1593	-1.8	-3.4	1.8	6.0	.153	.725	.00628	-.00012	.00028
1594	-1.8	-2.7	1.4	4.1	.153	.725	.00458	-.00006	.00021
1595	-1.8	-2.0	1.0	2.1	.154	.725	.00281	-.00001	.00016

Table 12. Continued

(b) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.55$

RUN	55								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1499	.0	-2.4	.9	2.0	.151	.750	.00313	.00008	.00016
1500	.0	-2.7	1.6	4.0	.148	.750	.00490	.00008	.00020
1501	.0	-3.6	1.9	6.0	.146	.749	.00666	.00008	.00027
1502	.0	-4.4	2.2	8.0	.145	.746	.00850	.00007	.00037
1503	.0	-5.1	2.6	10.0	.150	.751	.01011	.00005	.00049
1504	.0	-5.9	3.2	12.0	.152	.752	.01173	.00000	.00066
1507	-1.8	-5.0	2.7	10.0	.153	.752	.00977	-.00026	.00053
1508	-1.8	-5.7	3.1	12.0	.152	.751	.01134	-.00035	.00069
1509	-1.8	-4.2	2.2	8.0	.151	.751	.00810	-.00018	.00040
1510	-1.8	-3.6	1.8	6.0	.152	.752	.00641	-.00012	.00030
1513	-1.8	-2.8	1.4	4.0	.154	.753	.00469	-.00004	.00022
1514	-1.8	-2.2	1.0	2.1	.156	.754	.00295	.00002	.00018
1515	-5.1	-1.7	1.1	2.1	.155	.753	.00216	-.00007	.00018
1516	-5.1	-2.3	1.4	4.0	.155	.752	.00389	-.00022	.00024
1517	-5.1	-2.9	1.8	6.0	.152	.751	.00560	-.00036	.00032
1518	-5.1	-3.6	2.2	7.9	.151	.750	.00730	-.00053	.00043
1519	-5.1	-4.4	2.7	10.0	.151	.750	.00894	-.00070	.00056
1520	-5.1	-5.2	3.1	12.0	.152	.750	.01052	-.00086	.00072
1521	-5.1	-5.5	3.3	12.9	.152	.750	.01125	-.00095	.00081
1522	.0	-1.6	2.0	2.0	.303	.849	.00333	.00021	.00014
1523	.0	-2.5	2.9	4.0	.303	.848	.00517	.00019	.00016
1524	.0	-3.4	3.9	6.0	.304	.849	.00699	.00015	.00020
1525	.0	-4.3	4.8	8.0	.304	.848	.00873	.00012	.00027
1526	.0	-5.1	5.7	10.0	.302	.848	.01029	.00007	.00038
1527	.0	-5.1	5.7	10.0	.303	.847	.01031	.00007	.00037
1528	.0	-5.6	6.2	11.0	.303	.846	.01102	.00002	.00045
1529	-6.2	-1.4	2.4	4.0	.300	.847	.00232	-.00006	.00020
1531	-6.2	-3.2	4.2	8.0	.302	.847	.00573	-.00047	.00037
1534	-6.2	-4.1	5.1	10.0	.301	.847	.00735	-.00068	.00049
1535	-6.2	-5.1	6.0	12.0	.302	.846	.00893	-.00089	.00063
1536	-6.2	-6.1	6.9	14.0	.301	.844	.01035	-.00110	.00081
1537	-8.0	-3.7	4.8	10.0	.301	.847	.00655	-.00078	.00050
1538	-8.0	-4.7	5.7	12.0	.301	.847	.00815	-.00103	.00065
1539	-8.0	-5.6	6.7	14.0	.300	.845	.00960	-.00128	.00083
1540	-8.0	-2.9	3.9	8.0	.300	.847	.00493	-.00052	.00038
1541	-8.0	-2.0	3.0	6.0	.300	.846	.00324	-.00026	.00027

Table 12. Continued

(c) $\rho = 0.009$ slug/ft^3; $M_T = 0.628$; $\gamma = 14.32$

RUN	108								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3092	-5.0	-2.8	3.6	7.9	.346	.878	.00504	-.00020	.00029
3093	-5.0	-4.0	4.3	9.9	.347	.878	.00637	-.00036	.00037
3094	-5.0	-5.3	5.0	12.0	.347	.877	.00768	-.00053	.00048
3095	-5.0	-5.6	5.1	12.5	.346	.875	.00804	-.00057	.00051
3096	-5.0	-4.0	4.3	9.9	.347	.875	.00642	-.00035	.00038
3097	-5.0	-2.8	3.6	7.9	.348	.876	.00509	-.00019	.00030
3098	-9.2	-2.0	3.1	8.0	.343	.875	.00327	-.00024	.00031
3099	-9.2	-3.2	3.7	9.9	.343	.875	.00456	-.00049	.00041
3100	-9.2	-4.3	4.5	12.0	.344	.875	.00587	-.00075	.00053
3101	-9.2	-5.0	4.7	13.0	.343	.874	.00652	-.00087	.00060
3102	-9.2	-5.6	5.0	13.9	.344	.873	.00714	-.00101	.00067
3103	-9.2	-3.1	3.7	9.9	.343	.874	.00458	-.00048	.00042
3104	-9.2	-2.1	3.1	7.9	.344	.850	.00323	-.00022	.00031
3105	-9.2	-3.2	3.8	9.9	.344	.850	.00457	-.00048	.00042
3106	-9.2	-4.5	4.5	12.0	.344	.849	.00586	-.00074	.00054
3107	-9.2	-5.7	5.0	13.9	.345	.849	.00716	-.00100	.00067
3108	-5.0	-4.2	4.3	9.9	.346	.849	.00641	-.00034	.00038
3109	-5.0	-5.4	5.0	11.9	.347	.850	.00769	-.00051	.00048
3110	-5.0	-6.0	5.4	13.0	.347	.849	.00831	-.00059	.00054
3111	-5.0	-6.7	5.6	13.9	.346	.849	.00889	-.00068	.00061
3112	-5.0	-3.0	3.6	8.0	.347	.849	.00511	-.00019	.00030
3113	-5.0	-1.8	2.8	6.0	.347	.849	.00370	-.00003	.00024
3114	-6.2	-2.1	2.3	5.9	.297	.817	.00368	-.00018	.00025
3115	-6.2	-3.1	2.9	8.0	.297	.818	.00514	-.00037	.00032
3116	-6.2	-4.3	3.5	10.0	.296	.817	.00651	-.00056	.00041
3117	-6.2	-5.3	4.1	12.0	.295	.817	.00787	-.00075	.00052
3118	-6.2	-5.9	4.3	13.0	.297	.818	.00854	-.00085	.00058
3119	.0	-5.3	4.0	9.9	.299	.818	.00913	.00009	.00028
3120	.0	-4.4	3.4	8.0	.300	.818	.00775	.00012	.00020
3121	.0	-3.2	2.7	6.0	.300	.818	.00632	.00016	.00015
3122	.0	-2.1	2.0	4.0	.299	.818	.00483	.00019	.00012
3123	.0	-1.0	1.3	2.0	.297	.817	.00328	.00022	.00012
3124	-.1	-2.0	.1	2.0	.149	.723	.00317	.00009	.00015
3125	-.1	-2.8	.3	4.0	.150	.724	.00473	.00008	.00018
3126	-.1	-3.6	.5	6.0	.149	.724	.00627	.00007	.00023
3128	-.1	-4.3	.7	8.0	.149	.724	.00774	.00006	.00030
3129	-.1	-5.0	.9	9.9	.150	.724	.00921	.00004	.00040
3130	-1.8	-4.9	1.0	9.9	.150	.724	.00873	-.00023	.00042
3131	-1.8	-4.1	.7	8.0	.151	.725	.00729	-.00017	.00032
3132	-1.8	-3.4	.5	6.0	.151	.725	.00584	-.00011	.00024
3133	-1.8	-2.6	.3	3.9	.151	.725	.00432	-.00005	.00019

Table 12. Concluded

(d) $\rho = 0.009$ slug/ft^3; $M_T = 0.65$; $\gamma = 14.32$

RUN	107								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
3051	-1.8	-3.3	.7	6.0	.150	.748	.00565	-.00011	.00025
3052	-1.8	-4.0	.7	8.0	.148	.748	.00720	-.00016	.00033
3053	-1.8	-4.4	.8	9.0	.149	.749	.00796	-.00019	.00037
3054	-1.8	-4.4	.8	9.0	.147	.747	.00801	-.00019	.00038
3055	-1.8	-4.1	.7	8.0	.149	.749	.00729	-.00016	.00033
3056	-1.8	-3.3	.5	6.0	.151	.750	.00583	-.00010	.00026
3057	-5.0	-3.0	.6	6.0	.151	.749	.00503	-.00035	.00028
3058	-5.0	-3.7	.7	8.0	.151	.749	.00651	-.00049	.00036
3059	-5.0	-4.4	.9	9.9	.149	.748	.00795	-.00064	.00046
3060	-5.0	-4.4	.9	9.9	.149	.748	.00793	-.00064	.00046
3061	-5.0	-3.7	.7	8.0	.150	.749	.00652	-.00048	.00036
3062	-5.0	-2.9	.5	6.0	.150	.749	.00504	-.00034	.00028
3063	-5.0	-2.9	.5	6.0	.149	.748	.00504	-.00034	.00028
3064	.0	-3.5	.5	6.0	.150	.749	.00628	.00009	.00025
3065	.0	-4.3	.7	8.0	.148	.747	.00775	.00008	.00032
3066	.0	-4.7	.8	9.0	.148	.747	.00851	.00007	.00036
3067	.0	-4.3	.7	8.0	.148	.747	.00775	.00007	.00032
3068	.0	-3.5	.5	6.0	.149	.748	.00629	.00009	.00024
3069	.0	-2.8	.3	4.0	.151	.749	.00474	.00008	.00019
3070	-6.2	-1.9	2.3	6.0	.296	.844	.00366	-.00019	.00025
3071	-6.2	-3.0	2.9	8.0	.297	.844	.00511	-.00038	.00032
3072	-6.2	-4.1	3.6	10.0	.296	.844	.00654	-.00058	.00042
3073	-6.2	-5.3	4.1	12.0	.296	.844	.00781	-.00078	.00052
3074	-6.2	-5.6	4.2	12.5	.297	.843	.00818	-.00083	.00055
3075	-6.2	-4.2	3.5	10.0	.298	.844	.00651	-.00059	.00042
3076	-6.2	-1.9	2.3	6.0	.297	.843	.00370	-.00020	.00025
3077	-8.0	-2.7	2.8	8.0	.296	.843	.00440	-.00044	.00034
3078	-8.0	-3.8	3.4	10.0	.296	.844	.00577	-.00067	.00043
3079	-8.0	-4.9	4.0	12.0	.296	.844	.00708	-.00090	.00055
3080	-8.0	-5.5	4.2	13.0	.295	.843	.00779	-.00103	.00061
3081	-8.0	-3.8	3.3	10.0	.296	.843	.00576	-.00067	.00043
3083	-8.0	-2.6	2.8	8.0	.297	.843	.00438	-.00044	.00033
3084	.0	-2.9	2.7	6.0	.298	.843	.00631	.00014	.00016
3085	.0	-4.1	3.4	8.0	.298	.843	.00774	.00008	.00021
3086	.0	-3.0	2.8	6.0	.300	.844	.00627	.00011	.00015
3087	.0	-2.0	2.0	4.0	.299	.845	.00473	.00015	.00012

Table 13. Rotor Performance Data for Advanced Elastic Blade Set
With $I_b = 0.6735$ slug-ft^2

(a) $\rho = 0.00382$ slug/ft^3; $M_T = 0.65$; $\gamma = 6.08$

RUN 95

POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2786	-1.8	-2.8	1.3	4.0	.149	.749	.00449	-.00005	.00019
2787	-1.8	-3.5	1.8	6.0	.149	.749	.00634	-.00012	.00026
2788	-1.8	-4.2	2.3	8.0	.153	.751	.00815	-.00019	.00035
2792	-1.8	-6.5	4.3	14.0	.149	.749	.01299	-.00047	.00092
2793	.0	-6.8	4.4	14.0	.153	.751	.01343	-.00010	.00091
2794	.0	-6.0	3.6	12.0	.148	.752	.01207	.00001	.00069
2795	.0	-5.1	3.0	10.0	.154	.752	.01065	.00012	.00052
2796	.0	-4.4	2.4	8.0	.154	.752	.00891	.00015	.00038
2797	.0	-3.7	1.9	6.0	.154	.752	.00711	.00017	.00029
2798	.0	-3.0	1.3	4.0	.153	.751	.00526	.00017	.00023
2799	-5.0	-3.1	1.8	6.0	.154	.752	.00556	-.00030	.00033
2800	-5.0	-3.8	2.3	8.0	.154	.752	.00735	-.00047	.00043
2801	-5.0	-4.5	2.8	10.0	.150	.750	.00912	-.00065	.00057
2802	-5.0	-5.2	3.4	12.0	.152	.751	.01075	-.00086	.00074
2803	-5.0	-6.1	4.1	14.0	.149	.749	.01222	-.00108	.00095
2804	-6.2	-3.2	4.2	8.0	.304	.851	.00567	-.00038	.00040
2805	-6.2	-4.0	5.3	10.0	.304	.850	.00737	-.00060	.00051
2806	-6.2	-5.0	6.4	12.0	.303	.850	.00883	-.00082	.00066
2807	-6.2	-6.1	7.5	14.0	.303	.850	.01009	-.00109	.00088
2808	-6.2	-7.3	8.8	16.0	.303	.849	.01116	-.00138	.00118
2809	-8.0	-6.8	8.4	16.0	.304	.849	.01063	-.00156	.00116
2810	-8.0	-5.6	7.2	14.0	.302	.849	.00947	-.00125	.00087
2811	-8.0	-4.7	6.2	12.0	.304	.850	.00804	-.00098	.00067
2812	-8.0	-3.7	5.0	10.0	.304	.850	.00646	-.00070	.00051
2813	-8.0	-2.8	4.1	8.0	.305	.851	.00483	-.00043	.00039
2816	.0	-4.1	5.0	8.0	.306	.850	.00862	.00012	.00027
2817	.0	-5.1	6.2	10.0	.307	.850	.01004	.00001	.00041
2818	.0	-6.1	7.3	12.0	.307	.850	.01137	-.00016	.00061
2819	.0	-7.3	8.6	14.0	.307	.850	.01241	-.00039	.00089
2820	-9.2	-5.0	7.6	14.0	.354	.884	.00803	-.00118	.00079
2821	-9.2	-6.2	8.8	16.0	.353	.883	.00935	-.00149	.00106
2822	-9.2	-4.1	6.5	12.0	.352	.883	.00657	-.00088	.00061
2823	-9.2	-3.2	5.3	10.0	.350	.881	.00501	-.00059	.00046
2824	-5.0	-4.0	6.1	10.0	.355	.882	.00711	-.00044	.00043
2825	-5.0	-4.9	7.3	12.0	.355	.882	.00854	-.00064	.00058
2826	-5.0	-6.0	8.7	14.0	.355	.882	.00974	-.00087	.00081
2827	-5.0	-7.3	9.9	16.0	.355	.881	.01073	-.00116	.00111
2828	-5.0	-3.1	4.8	8.0	.355	.881	.00554	-.00030	.00031

Table 13. Continued

(b) $\rho = 0.006$ slug/ft^3; $M_T = 0.628$; $\gamma = 9.55$

RUN	90	HOVER			
POINT	A_1	B_1	θ	C_T	C_Q
2677	.1	.1	5.9	.00311	.00024
2678	.0	.0	7.9	.00445	.00033
2679	.0	.0	9.8	.00581	.00045
2680	.0	.0	11.4	.00692	.00055
2681	.0	.0	11.6	.00709	.00057
2682	.1	.1	12.8	.00797	.00067
2683	.0	.0	13.9	.00872	.00076
2684	.0	.0	14.0	.00894	.00078
2685	.0	.0	15.0	.00965	.00089
2686	.0	.0	16.1	.01037	.00100
2687	.1	.1	13.9	.00886	.00077
2688	.0	.1	11.4	.00697	.00055

Table 13. Continued

(b) Continued

RUN	74								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2111	.0	-1.3	1.1	2.0	.152	.726	.00252	.00009	.00013
2112	.0	-2.6	1.1	4.1	.150	.724	.00435	.00008	.00016
2113	.0	-2.7	1.8	6.0	.150	.724	.00603	.00006	.00022
2114	.0	-3.3	2.2	8.0	.149	.722	.00775	.00006	.00030
2115	.0	-4.6	2.1	10.0	.151	.724	.00936	.00004	.00040
2116	.1	-5.2	2.6	12.1	.149	.723	.01102	.00001	.00054
2117	.1	-5.7	2.7	13.0	.152	.725	.01173	-.00001	.00062
2118	-1.8	-4.3	2.3	10.0	.152	.725	.00901	-.00023	.00043
2119	-1.8	-5.1	2.5	12.0	.151	.724	.01056	-.00032	.00056
2120	-1.8	-5.5	2.7	13.0	.152	.725	.01128	-.00037	.00065
2121	-1.8	-3.7	1.9	8.0	.153	.726	.00745	-.00017	.00032
2122	-1.8	-3.0	1.6	6.0	.156	.727	.00577	-.00011	.00024
2123	-1.8	-2.3	1.2	4.1	.154	.727	.00414	-.00005	.00018
2124	-1.8	-1.6	.9	2.0	.154	.727	.00240	.00002	.00015
2125	.1	-.3	2.0	2.1	.304	.821	.00273	.00022	.00011
2126	.1	-1.3	2.8	4.1	.305	.821	.00448	.00020	.00012
2127	.1	-2.2	3.7	6.0	.305	.821	.00617	.00016	.00015
2128	.1	-3.2	4.6	8.0	.306	.822	.00778	.00010	.00020
2129	.1	-4.2	5.4	10.0	.304	.821	.00926	.00002	.00030
2130	.1	-5.3	6.2	12.0	.305	.821	.01061	-.00010	.00044
2131	-6.2	-1.5	3.0	6.0	.303	.820	.00343	-.00017	.00023
2133	-6.2	-3.4	4.6	10.0	.304	.821	.00658	-.00059	.00040
2134	-6.2	-4.3	5.4	12.0	.303	.820	.00808	-.00080	.00052
2135	-6.2	-5.4	6.2	14.0	.302	.820	.00949	-.00103	.00069
2136	-6.2	-6.7	6.9	16.0	.303	.819	.01065	-.00128	.00090
2137	-5.0	-1.9	4.6	8.0	.353	.852	.00493	-.00020	.00028
2138	-5.0	-2.9	5.5	10.0	.353	.852	.00644	-.00038	.00036
2139	-5.0	-4.1	6.3	12.0	.354	.851	.00784	-.00057	.00048
2140	-5.0	-5.2	7.2	14.0	.354	.852	.00916	-.00077	.00064
2141	-5.0	-6.5	8.0	16.0	.355	.852	.01030	-.00099	.00086
2142	-5.0	-.9	3.6	6.0	.352	.850	.00339	-.00003	.00020
2143	-9.2	-1.2	3.9	8.0	.348	.850	.00300	-.00021	.00028
2145	-9.2	-2.3	4.8	10.0	.350	.851	.00449	-.00050	.00039
2146	-9.2	-3.2	5.7	12.0	.352	.851	.00596	-.00077	.00052
2147	-9.2	-4.4	6.5	14.0	.352	.851	.00739	-.00106	.00068
2148	-9.2	-4.9	6.8	15.0	.351	.851	.00809	-.00120	.00076
2149	-9.2	-5.6	7.2	16.0	.351	.851	.00874	-.00136	.00087
2150	-9.1	-2.0	4.6	10.0	.350	.882	.00453	-.00049	.00039
2151	-9.2	-3.1	5.6	12.0	.350	.883	.00594	-.00077	.00052
2152	-9.2	-4.2	6.4	14.0	.349	.882	.00745	-.00106	.00067
2153	-9.2	-4.8	6.8	15.0	.351	.882	.00813	-.00122	.00077
2154	-5.0	-1.6	4.5	8.0	.353	.882	.00489	-.00019	.00027
2155	-5.0	-2.7	5.5	10.0	.353	.882	.00641	-.00038	.00036
2156	-5.0	-3.8	6.3	12.0	.353	.882	.00785	-.00057	.00048
2157	-5.0	-4.9	7.2	14.0	.353	.882	.00915	-.00077	.00064
2158	-5.0	-5.6	7.6	15.0	.353	.882	.00972	-.00088	.00075
2159	-9.2	-5.4	7.2	16.0	.350	.882	.00874	-.00136	.00087

Table 13. Continued

(b) Continued

RUN	81								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2306	-1.9	-3.8	1.7	7.7	.150	.724	.00695	-.00017	.00028
2307	-1.7	-3.8	1.7	7.8	.149	.722	.00713	-.00016	.00029
2308	-1.7	-3.8	1.7	7.8	.150	.723	.00711	-.00016	.00029
2309	-1.6	-4.3	1.9	8.8	.150	.723	.00795	-.00018	.00034
2310	-1.6	-4.2	1.9	8.8	.149	.723	.00794	-.00018	.00034
2311	-1.3	-4.6	2.0	9.7	.149	.722	.00878	-.00016	.00039
2312	-1.3	-4.6	2.0	9.7	.150	.723	.00875	-.00016	.00038
2313	-1.3	-4.7	2.0	9.9	.151	.724	.00891	-.00017	.00040
2314	-1.3	-4.7	2.0	9.9	.152	.723	.00894	-.00017	.00040
2315	-3.2	-4.7	2.1	10.5	.150	.723	.00887	-.00046	.00045
2316	-3.2	-4.7	2.1	10.5	.151	.724	.00886	-.00047	.00045
2317	-1.1	-5.1	2.2	10.8	.151	.724	.00966	-.00017	.00045
2318	-1.1	-5.1	2.2	10.8	.149	.723	.00966	-.00016	.00045
2319	-1.0	-5.5	2.4	11.9	.150	.722	.01051	-.00017	.00053
2320	-1.0	-5.5	2.4	11.9	.149	.722	.01051	-.00017	.00053
2321	-2.6	-5.3	2.4	12.2	.150	.723	.01033	-.00046	.00057
2322	-2.6	-5.3	2.4	12.2	.151	.723	.01031	-.00047	.00057
2323	-1.0	-5.6	2.4	12.2	.150	.723	.01076	-.00019	.00055
2324	-1.0	-5.6	2.4	12.2	.150	.723	.01074	-.00019	.00055
2325	-.8	-6.0	2.6	13.2	.150	.723	.01145	-.00019	.00063
2326	-.8	-6.0	2.6	13.2	.149	.722	.01145	-.00019	.00063

Table 13. Continued

(b) Continued

RUN	82								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2330	-2.5	-3.7	2.6	7.9	.203	.757	.00700	-.00025	.00027
2331	-2.5	-3.7	2.6	8.0	.204	.758	.00708	-.00025	.00027
2332	-2.5	-3.8	2.7	8.2	.202	.757	.00726	-.00026	.00028
2333	-2.5	-3.8	2.7	8.3	.203	.757	.00728	-.00026	.00028
2334	-2.2	-4.2	2.9	9.0	.203	.757	.00809	-.00026	.00032
2335	-2.2	-4.2	2.8	9.1	.203	.757	.00809	-.00026	.00031
2336	-1.8	-4.7	3.2	10.1	.201	.755	.00909	-.00026	.00037
2337	-1.8	-4.7	3.2	10.2	.203	.756	.00911	-.00026	.00037
2338	-1.8	-4.8	3.2	10.3	.203	.756	.00922	-.00027	.00037
2339	-1.8	-4.8	3.2	10.3	.201	.755	.00923	-.00027	.00038
2340	-5.1	-5.0	3.4	11.7	.202	.756	.00921	-.00079	.00051
2341	-5.1	-4.9	3.4	11.7	.201	.756	.00924	-.00078	.00051
2342	-1.6	-5.1	3.4	11.0	.202	.756	.00984	-.00026	.00041
2345	-1.6	-5.1	3.4	11.0	.202	.756	.00986	-.00026	.00042
2346	-1.5	-5.2	3.5	11.2	.202	.756	.01004	-.00026	.00043
2347	-1.5	-5.2	3.5	11.2	.204	.757	.01004	-.00026	.00043
2348	-4.4	-5.4	3.7	12.5	.202	.756	.01003	-.00076	.00056
2349	-4.5	-5.4	3.7	12.5	.203	.757	.01001	-.00077	.00056
2350	-1.5	-5.3	3.5	11.4	.203	.757	.01018	-.00026	.00044
2351	-1.5	-5.3	3.5	11.4	.202	.756	.01020	-.00025	.00044
2352	-1.2	-5.8	3.8	12.4	.201	.756	.01109	-.00026	.00051
2356	-1.8	-6.0	5.3	13.2	.254	.789	.01110	-.00040	.00054
2358	-2.3	-5.4	4.8	12.0	.253	.788	.01013	-.00040	.00046
2359	-6.7	-5.9	5.2	14.3	.252	.789	.01013	-.00120	.00072
2360	-6.7	-5.9	5.2	14.3	.253	.789	.01010	-.00120	.00072
2361	-2.3	-5.3	4.8	12.0	.253	.788	.01009	-.00039	.00045
2362	-2.3	-5.3	4.8	12.0	.254	.789	.01009	-.00039	.00045
2363	-2.4	-5.2	4.8	11.9	.252	.787	.00996	-.00039	.00045
2364	-2.4	-5.2	4.8	11.9	.254	.789	.00996	-.00039	.00045

Table 13. Continued

(b) Continued

RUN	83								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2368	-4.0	-3.7	3.6	8.8	.252	.789	.00703	-.00041	.00032
2369	-4.0	-3.7	3.6	8.8	.252	.789	.00707	-.00040	.00032
2370	-3.9	-3.8	3.7	9.0	.252	.788	.00727	-.00041	.00033
2371	-3.9	-3.8	3.7	9.0	.253	.788	.00727	-.00040	.00033
2372	-3.4	-4.3	4.0	9.8	.253	.789	.00817	-.00041	.00037
2373	-3.4	-4.2	4.0	9.8	.253	.789	.00817	-.00041	.00037
2374	-3.0	-4.7	4.4	10.8	.252	.788	.00901	-.00043	.00041
2375	-3.0	-4.7	4.4	10.8	.254	.789	.00901	-.00042	.00041
2376	-2.9	-4.7	4.5	10.9	.253	.788	.00914	-.00041	.00041
2377	-2.9	-4.7	4.5	10.9	.254	.789	.00914	-.00041	.00042
2378	-8.0	-5.1	4.9	13.4	.251	.789	.00910	-.00123	.00067
2379	-8.0	-5.1	4.9	13.4	.251	.788	.00910	-.00123	.00067
2381	-5.0	-3.8	4.5	9.9	.282	.806	.00729	-.00051	.00039
2382	-5.0	-3.9	4.5	8.0	.283	.808	.00519	-.00041	.00031
2383	-5.0	-3.9	4.5	9.0	.282	.807	.00623	-.00047	.00035
2384	-5.0	-3.9	4.5	10.0	.281	.807	.00731	-.00052	.00039
2385	-5.0	-3.8	4.5	11.0	.281	.807	.00840	-.00054	.00044
2386	-5.0	-3.8	4.5	12.0	.280	.806	.00942	-.00054	.00049
2387	-5.0	-5.8	4.5	9.9	.282	.807	.00665	-.00064	.00041
2388	-5.0	-4.8	4.5	9.9	.281	.807	.00700	-.00058	.00040
2389	-5.0	-3.8	4.4	10.0	.281	.807	.00731	-.00052	.00039
2390	-5.0	-2.8	4.5	9.9	.283	.808	.00759	-.00045	.00038
2391	-5.0	-1.8	4.5	9.9	.280	.808	.00790	-.00037	.00036
2392	-5.0	-3.8	2.5	10.0	.281	.807	.00802	-.00039	.00037
2393	-5.0	-3.9	3.5	9.9	.281	.807	.00757	-.00047	.00037
2394	-5.0	-3.8	4.5	9.9	.281	.807	.00724	-.00052	.00039
2395	-5.0	-3.8	5.5	9.9	.283	.808	.00691	-.00058	.00040
2396	-5.0	-3.8	6.4	9.9	.280	.806	.00658	-.00062	.00041
2398	-4.1	-4.3	4.9	10.7	.282	.806	.00816	-.00051	.00041
2399	-4.1	-4.3	4.9	10.7	.282	.806	.00818	-.00051	.00041
2400	-4.2	-4.3	4.9	8.6	.283	.807	.00607	-.00045	.00033
2401	-4.1	-4.2	4.9	9.7	.283	.807	.00714	-.00049	.00037
2402	-4.1	-4.2	4.9	10.7	.282	.806	.00816	-.00051	.00041
2403	-4.1	-4.2	4.9	11.7	.283	.807	.00923	-.00052	.00046
2404	-4.1	-4.2	4.9	12.7	.282	.806	.01022	-.00050	.00053
2405	-4.2	-6.3	4.9	10.7	.282	.806	.00757	-.00067	.00044
2406	-4.1	-5.3	4.9	10.7	.281	.806	.00791	-.00060	.00043
2407	-4.1	-4.2	4.9	10.8	.283	.807	.00829	-.00052	.00041
2408	-4.1	-3.3	4.9	10.7	.281	.807	.00851	-.00044	.00040
2409	-4.1	-2.3	4.9	10.7	.281	.806	.00882	-.00035	.00038
2410	-4.1	-4.3	2.9	10.7	.282	.806	.00890	-.00036	.00038
2411	-4.1	-4.3	3.9	10.6	.283	.807	.00846	-.00045	.00040
2412	-4.1	-4.3	4.9	10.7	.283	.807	.00817	-.00053	.00041
2413	-4.1	-4.3	5.9	10.7	.282	.806	.00786	-.00059	.00042
2414	-4.1	-4.3	6.9	10.7	.283	.807	.00749	-.00066	.00043
2415	-3.9	-1.3	7.1	7.3	.284	.808	.00486	-.00032	.00027
2416	-3.5	-4.7	5.3	11.5	.283	.807	.00904	-.00053	.00045

Table 13. Continued

(b) Continued

RUN	83								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2417	-3.5	-4.7	5.3	11.5	.283	.807	.00904	-.00053	.00045
2418	-3.5	-4.7	5.3	9.4	.285	.808	.00689	-.00050	.00036
2419	-3.5	-4.7	5.3	10.5	.283	.807	.00798	-.00052	.00040
2420	-3.5	-4.7	5.3	11.5	.282	.806	.00898	-.00053	.00045
2421	-3.5	-4.7	5.3	12.5	.282	.806	.01001	-.00052	.00051
2422	-3.5	-4.7	5.3	13.5	.282	.806	.01092	-.00050	.00058
2423	-3.6	-6.7	5.3	11.5	.283	.807	.00839	-.00072	.00048
2424	-3.5	-5.7	5.3	11.5	.283	.807	.00870	-.00063	.00046
2425	-3.5	-4.7	5.3	11.5	.283	.807	.00906	-.00053	.00045
2426	-3.5	-3.7	5.3	11.5	.283	.807	.00934	-.00044	.00043
2427	-3.5	-2.8	5.3	11.5	.282	.806	.00962	-.00034	.00042
2428	-3.5	-4.7	3.3	11.5	.283	.807	.00972	-.00036	.00042
2429	-3.5	-4.7	4.3	11.5	.283	.807	.00936	-.00045	.00043
2430	-3.5	-4.7	5.3	11.5	.283	.807	.00897	-.00054	.00045
2431	-3.5	-4.7	6.3	11.5	.283	.807	.00861	-.00062	.00046
2432	-3.6	-4.7	7.3	11.4	.283	.807	.00825	-.00070	.00047

Table 13. Continued

(b) Continued

RUN	84								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2438	-2.2	-4.2	2.8	8.9	.199	.755	.00822	-.00024	.00033
2439	-3.4	-4.3	4.0	9.8	.250	.786	.00825	-.00039	.00037
2440	-4.3	-4.3	4.8	10.7	.280	.805	.00818	-.00050	.00042
2441	-3.1	-5.5	5.5	12.3	.279	.804	.00983	-.00052	.00053
2442	-3.1	-5.5	5.6	12.3	.279	.803	.00984	-.00052	.00053
2443	-3.1	-5.6	5.6	10.4	.280	.804	.00775	-.00051	.00042
2444	-3.1	-5.6	5.6	11.4	.280	.804	.00885	-.00052	.00047
2445	-3.1	-5.5	5.6	12.4	.280	.804	.00980	-.00052	.00053
2446	-3.1	-5.6	5.5	13.4	.279	.803	.01073	-.00049	.00060
2447	-3.1	-5.5	5.6	14.4	.280	.804	.01158	-.00046	.00069
2448	-3.1	-7.6	5.5	12.3	.280	.804	.00915	-.00072	.00055
2449	-3.1	-6.6	5.6	12.3	.281	.804	.00948	-.00062	.00054
2450	-3.1	-5.5	5.6	12.3	.281	.804	.00981	-.00052	.00053
2451	-3.1	-4.6	5.6	12.4	.281	.804	.01012	-.00041	.00052
2452	-3.1	-3.6	5.6	12.4	.280	.804	.01041	-.00030	.00051
2453	-3.1	-5.6	3.6	12.4	.281	.804	.01049	-.00032	.00050
2454	-3.1	-5.6	4.6	12.4	.280	.804	.01012	-.00043	.00051
2455	-3.1	-5.6	5.6	12.3	.280	.804	.00976	-.00052	.00052
2456	-3.1	-5.6	6.6	12.3	.280	.804	.00941	-.00061	.00053
2457	-3.1	-5.6	7.5	12.3	.280	.804	.00911	-.00070	.00055
2458	-2.6	-6.2	6.0	13.5	.280	.804	.01069	-.00056	.00061
2459	-2.6	-6.2	6.0	13.5	.279	.803	.01069	-.00056	.00061
2460	-2.6	-6.2	6.1	11.4	.281	.804	.00875	-.00057	.00047
2461	-2.6	-6.2	6.1	12.5	.280	.803	.00975	-.00057	.00053
2462	-2.6	-6.2	6.0	13.4	.280	.802	.01068	-.00056	.00061
2465	-2.6	-6.1	6.1	14.4	.280	.803	.01151	-.00053	.00070
2466	-2.6	-6.2	6.0	15.5	.280	.803	.01235	-.00049	.00081
2467	-2.6	-8.4	6.3	13.4	.279	.805	.00991	-.00085	.00064
2468	-2.6	-7.2	6.0	13.4	.280	.805	.01038	-.00069	.00062
2469	-2.6	-6.2	6.0	13.5	.279	.805	.01068	-.00057	.00061
2470	-2.6	-5.2	6.1	13.5	.279	.805	.01097	-.00045	.00060
2471	-2.6	-4.3	6.0	13.5	.279	.805	.01122	-.00032	.00059
2472	-2.6	-6.2	4.1	13.5	.278	.804	.01131	-.00035	.00058
2473	-2.6	-6.2	5.1	13.4	.278	.804	.01095	-.00047	.00059
2474	-2.6	-6.3	6.0	13.4	.279	.805	.01061	-.00058	.00060
2475	-2.6	-6.2	7.0	13.4	.279	.804	.01030	-.00068	.00061
2476	-2.6	-6.2	8.0	13.3	.279	.805	.00998	-.00079	.00062
2477	-1.7	-6.9	6.5	14.4	.281	.806	.01152	-.00054	.00068
2478	-1.7	-6.9	6.5	14.4	.280	.805	.01151	-.00054	.00068

Table 13. Continued

(b) Continued

RUN	85								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2482	-2.2	-6.1	5.9	13.2	.280	.806	.01068	-.00052	.00056
2483	-2.2	-6.1	6.0	13.2	.279	.805	.01068	-.00052	.00056
2488	-5.6	-4.0	4.9	10.5	.300	.819	.00703	-.00060	.00039
2489	-5.6	-4.0	4.9	10.5	.301	.819	.00703	-.00060	.00039
2491	-5.1	-4.1	4.9	10.4	.301	.818	.00728	-.00056	.00038
2492	-5.1	-4.1	4.9	10.4	.302	.819	.00728	-.00056	.00038
2493	-4.3	-4.5	5.3	11.1	.302	.819	.00814	-.00056	.00041
2494	-4.3	-4.5	5.3	11.1	.301	.818	.00814	-.00055	.00041
2495	-3.6	-5.1	5.7	11.9	.300	.818	.00897	-.00056	.00046
2496	-3.6	-5.1	5.7	11.9	.301	.818	.00897	-.00057	.00046
2497	-3.4	-5.2	5.8	12.1	.301	.818	.00912	-.00056	.00046
2499	-3.4	-5.2	5.8	12.1	.302	.819	.00913	-.00057	.00046
2500	-10.9	-5.9	6.3	16.0	.297	.819	.00889	-.00174	.00089
2501	-10.9	-5.9	6.3	16.0	.298	.819	.00886	-.00173	.00088
2502	-2.9	-5.8	6.2	12.8	.302	.819	.00981	-.00058	.00053
2503	-2.9	-5.8	6.2	12.8	.303	.819	.00980	-.00058	.00053
2504	-2.4	-6.2	6.5	13.6	.302	.818	.01044	-.00059	.00059
2505	-2.4	-6.2	6.5	13.6	.302	.818	.01044	-.00058	.00058
2507	-9.6	-6.9	6.8	17.0	.299	.818	.00986	-.00174	.00102
2508	-2.5	-6.4	6.7	13.9	.301	.817	.01062	-.00060	.00063
2509	-2.5	-6.4	6.7	13.9	.301	.817	.01062	-.00060	.00063
2510	-1.7	-7.2	7.2	15.0	.302	.818	.01151	-.00060	.00075
2511	-1.7	-7.2	7.2	15.0	.301	.817	.01150	-.00061	.00074
RUN	86								
POINT	α_S	A_1	B_1	Θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2520	-3.9	-5.1	5.7	12.1	.300	.818	.00896	-.00060	.00048
2522	-7.7	-4.4	6.2	12.6	.349	.849	.00696	-.00081	.00055
2523	-7.7	-4.5	6.2	10.6	.347	.851	.00478	-.00060	.00042
2524	-7.7	-4.5	6.2	11.6	.348	.850	.00582	-.00071	.00049
2525	-7.7	-4.4	6.2	12.6	.348	.847	.00691	-.00080	.00055
2526	-7.7	-4.4	6.2	13.6	.349	.847	.00795	-.00086	.00062
2527	-7.7	-4.5	6.2	14.6	.348	.849	.00897	-.00091	.00070
2528	-7.7	-6.4	6.2	12.6	.347	.848	.00618	-.00089	.00056
2529	-7.7	-5.4	6.2	12.7	.348	.848	.00662	-.00086	.00056
2530	-7.7	-4.4	6.3	12.7	.349	.848	.00694	-.00080	.00056
2531	-7.7	-3.4	6.2	12.7	.348	.848	.00732	-.00074	.00055
2532	-7.7	-2.5	6.2	12.7	.348	.848	.00770	-.00068	.00053
2534	-7.7	-4.4	4.3	12.6	.349	.848	.00770	-.00072	.00053
2535	-7.7	-4.4	5.2	12.6	.349	.849	.00728	-.00076	.00054
2536	-7.7	-4.5	6.2	12.6	.349	.848	.00687	-.00081	.00055
2537	-7.7	-4.5	7.2	12.6	.348	.848	.00656	-.00086	.00056
2538	-7.7	-4.4	8.2	12.6	.348	.848	.00618	-.00088	.00056

Table 13. Continued

(b) Continued

RUN	87								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2542	-7.5	-4.4	6.2	12.6	.350	.850	.00705	-.00079	.00054
2544	-7.5	-4.4	6.2	10.6	.347	.848	.00494	-.00059	.00042
2545	-7.5	-4.4	6.2	11.6	.349	.848	.00599	-.00070	.00048
2546	-7.4	-4.4	6.2	12.6	.349	.849	.00705	-.00078	.00054
2547	-7.4	-4.4	6.2	13.6	.350	.849	.00813	-.00084	.00061
2548	-7.4	-4.4	6.2	14.6	.350	.849	.00914	-.00088	.00069
2549	-7.5	-6.4	6.2	12.6	.350	.849	.00635	-.00089	.00056
2550	-7.5	-5.4	6.2	12.6	.349	.848	.00678	-.00084	.00056
2551	-7.5	-4.4	6.3	12.7	.348	.848	.00710	-.00078	.00055
2552	-7.4	-3.4	6.2	12.6	.348	.848	.00745	-.00072	.00054
2553	-7.4	-2.5	6.2	12.6	.349	.848	.00781	-.00066	.00053
2554	-7.4	-4.4	4.3	12.6	.348	.848	.00791	-.00069	.00053
2555	-7.4	-4.4	5.2	12.6	.349	.848	.00747	-.00074	.00054
2556	-7.4	-4.4	6.2	12.6	.349	.848	.00704	-.00078	.00055
2557	-7.5	-4.4	7.2	12.5	.350	.848	.00663	-.00082	.00055
2558	-7.5	-4.4	8.2	12.6	.349	.848	.00623	-.00085	.00056
2559	-6.7	-5.1	6.7	13.4	.349	.847	.00792	-.00082	.00060
2560	-6.7	-5.1	6.7	11.4	.348	.847	.00575	-.00067	.00048
2561	-6.7	-5.1	6.7	12.4	.349	.848	.00688	-.00077	.00054
2562	-6.7	-5.1	6.7	13.4	.349	.848	.00791	-.00083	.00060
2563	-6.7	-5.0	6.7	14.4	.349	.848	.00893	-.00087	.00068
2564	-6.7	-5.1	6.6	15.4	.350	.847	.00988	-.00089	.00078
2565	-6.7	-7.1	6.7	13.4	.350	.847	.00724	-.00098	.00063
2566	-6.7	-6.1	6.6	13.5	.350	.847	.00763	-.00092	.00062
2567	-6.7	-5.1	6.6	13.4	.350	.847	.00799	-.00084	.00061
2568	-6.7	-4.2	6.5	13.4	.350	.847	.00835	-.00077	.00060
2569	-6.7	-3.1	6.7	13.5	.350	.847	.00871	-.00069	.00059
2570	-6.7	-5.1	4.7	13.5	.350	.847	.00880	-.00072	.00059
2572	-6.7	-5.1	5.6	13.4	.350	.847	.00838	-.00079	.00059
2573	-6.7	-5.1	6.6	13.4	.349	.846	.00795	-.00085	.00060
2574	-6.7	-5.1	7.6	13.4	.349	.846	.00759	-.00090	.00061
2575	-6.7	-5.1	8.6	13.4	.349	.845	.00721	-.00095	.00062
2576	-5.8	-5.5	7.1	14.1	.349	.846	.00885	-.00084	.00065
2577	-5.8	-5.5	7.1	12.1	.350	.846	.00678	-.00073	.00051
2578	-5.8	-5.5	7.2	13.1	.349	.845	.00786	-.00080	.00057
2579	-5.7	-5.5	7.1	14.1	.349	.845	.00884	-.00084	.00065
2580	-5.7	-5.5	7.1	15.1	.349	.845	.00979	-.00085	.00075
2581	-5.8	-7.6	7.2	14.1	.349	.845	.00812	-.00102	.00067
2582	-5.8	-6.5	7.2	14.1	.349	.845	.00851	-.00093	.00066
2583	-5.7	-5.6	7.2	14.1	.349	.845	.00885	-.00085	.00065
2584	-5.7	-4.5	7.2	14.2	.350	.847	.00922	-.00076	.00065
2587	-5.7	-5.6	5.2	14.1	.350	.848	.00959	-.00070	.00064
2588	-5.7	-5.6	6.2	14.1	.352	.848	.00919	-.00078	.00064
2589	-5.8	-5.6	7.2	14.1	.351	.848	.00880	-.00084	.00065
2590	-5.8	-5.6	8.2	14.1	.352	.848	.00839	-.00090	.00066
2591	-5.8	-5.6	9.2	14.1	.353	.848	.00806	-.00098	.00067

Table 13. Continued

(b) Continued

RUN	88								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2596	-5.1	-5.8	7.4	14.3	.351	.850	.00912	-.00080	.00068
2597	-5.1	-5.8	7.4	14.3	.352	.849	.00913	-.00080	.00068
2598	-5.1	-5.8	7.4	12.3	.352	.850	.00706	-.00071	.00054
2599	-5.1	-5.8	7.4	13.3	.351	.849	.00814	-.00076	.00060
2600	-5.1	-5.8	7.4	14.3	.350	.849	.00914	-.00078	.00068
2601	-5.1	-5.8	7.4	15.3	.351	.849	.01007	-.00079	.00078
2602	-5.1	-5.8	7.3	16.3	.352	.849	.01095	-.00078	.00091
2603	-5.1	-7.8	7.4	14.3	.351	.849	.00843	-.00097	.00071
2604	-5.1	-6.8	7.4	14.3	.352	.849	.00879	-.00087	.00070
2605	-5.1	-5.8	7.4	14.3	.352	.849	.00911	-.00078	.00069
2608	-5.1	-4.8	7.4	14.4	.352	.848	.00950	-.00068	.00069
2609	-5.1	-3.9	7.4	14.4	.353	.846	.00992	-.00059	.00069
2610	-5.1	-5.8	5.4	14.3	.351	.848	.00989	-.00063	.00068
2611	-5.1	-5.8	6.4	14.4	.352	.848	.00953	-.00071	.00069
2612	-5.1	-5.8	7.4	14.3	.352	.848	.00911	-.00078	.00069
2613	-5.1	-5.8	8.4	14.3	.351	.848	.00872	-.00084	.00070
2614	-5.1	-5.9	9.4	14.3	.351	.848	.00839	-.00092	.00071
2615	-5.3	-1.4	9.3	10.0	.351	.848	.00519	-.00041	.00041
2616	-4.4	-6.4	7.8	15.0	.352	.850	.00988	-.00080	.00076
2617	-4.4	-6.4	7.8	15.0	.352	.850	.00986	-.00079	.00076
2619	-3.7	-7.1	8.2	15.7	.353	.849	.01050	-.00080	.00086
2620	-3.8	-7.1	8.2	15.7	.352	.849	.01044	-.00080	.00085
2621	-3.6	-7.3	8.3	15.9	.352	.849	.01063	-.00081	.00088
2623	-8.8	-4.9	6.9	14.4	.373	.865	.00729	-.00094	.00071
2624	-8.8	-4.9	6.9	14.4	.374	.864	.00732	-.00094	.00071
2625	-8.8	-5.0	6.9	12.4	.372	.865	.00520	-.00070	.00055
2626	-8.8	-4.9	6.9	13.4	.373	.865	.00625	-.00084	.00063
2627	-8.8	-4.8	6.9	14.4	.373	.865	.00730	-.00094	.00071
2628	-8.8	-4.9	7.0	15.4	.372	.865	.00836	-.00102	.00079
2629	-8.8	-4.7	7.0	16.4	.372	.865	.00935	-.00106	.00089
2630	-8.8	-6.9	6.9	14.4	.373	.864	.00649	-.00104	.00071
2631	-8.8	-5.9	6.9	14.4	.372	.864	.00688	-.00101	.00071
2632	-8.8	-4.9	6.9	14.4	.372	.864	.00726	-.00096	.00070
2633	-8.8	-3.9	6.9	14.4	.372	.864	.00769	-.00090	.00069
2634	-8.8	-2.9	6.9	14.4	.372	.864	.00806	-.00084	.00069
2635	-8.8	-4.9	4.9	14.4	.372	.864	.00813	-.00089	.00069
2636	-8.8	-4.9	5.9	14.4	.373	.865	.00768	-.00093	.00069
2637	-8.8	-4.9	6.9	14.4	.372	.864	.00727	-.00097	.00070
2638	-8.8	-4.9	7.9	14.4	.372	.863	.00688	-.00101	.00070
2639	-8.8	-4.9	8.9	14.4	.372	.863	.00649	-.00102	.00070
2640	-7.6	-5.4	7.5	14.9	.373	.863	.00816	-.00098	.00073
2641	-7.6	-5.4	7.4	14.9	.373	.863	.00812	-.00097	.00073

Table 13. Continued

(b) Concluded

RUN	89								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2645	-7.3	-5.3	7.3	14.6	.373	.865	.00801	-.00092	.00068
2646	-7.3	-5.3	7.3	14.6	.373	.865	.00799	-.00092	.00068
2647	-7.3	-5.3	7.3	12.7	.374	.865	.00588	-.00076	.00054
2648	-7.3	-5.3	7.3	13.7	.374	.865	.00696	-.00085	.00061
2649	-7.3	-5.2	7.3	14.6	.374	.865	.00801	-.00092	.00068
2650	-7.3	-5.3	7.3	15.7	.374	.865	.00905	-.00097	.00077
2651	-7.3	-5.2	7.3	16.7	.374	.865	.00998	-.00098	.00089
2653	-7.3	-7.2	7.3	14.6	.375	.865	.00725	-.00106	.00070
2654	-7.3	-6.3	7.3	14.6	.374	.865	.00762	-.00100	.00069
2655	-7.3	-5.3	7.3	14.6	.374	.864	.00803	-.00093	.00069
2656	-7.3	-4.3	7.3	14.7	.374	.864	.00847	-.00086	.00068
2657	-7.3	-3.3	7.3	14.7	.373	.864	.00883	-.00078	.00068
2658	-7.3	-5.3	5.4	14.6	.374	.864	.00886	-.00083	.00067
2659	-7.3	-5.3	6.3	14.7	.374	.864	.00846	-.00089	.00068
2660	-7.3	-5.3	7.3	14.6	.374	.864	.00800	-.00094	.00069
2661	-7.3	-5.3	8.3	14.6	.374	.864	.00761	-.00099	.00069
2662	-7.3	-5.3	9.3	14.6	.374	.863	.00723	-.00104	.00070
2663	-6.3	-6.0	7.8	15.4	.374	.863	.00897	-.00098	.00076
2664	-6.3	-6.0	7.8	15.4	.375	.863	.00896	-.00098	.00076
2665	-5.2	-6.8	8.5	16.2	.375	.863	.00978	-.00098	.00085
2666	-5.2	-6.8	8.5	16.2	.375	.862	.00981	-.00098	.00085
2667	-4.2	-7.6	9.0	17.1	.375	.861	.01055	-.00096	.00099
2668	-10.6	-5.1	7.4	16.1	.398	.884	.00709	-.00113	.00082
2669	-10.5	-5.0	7.4	15.8	.397	.883	.00691	-.00109	.00079
2670	-10.4	-5.3	7.6	16.1	.397	.883	.00712	-.00113	.00082
2671	-10.4	-5.3	7.6	16.1	.397	.883	.00712	-.00113	.00082
2672	-9.0	-5.8	8.1	16.5	.399	.882	.00797	-.00113	.00087
2673	-9.0	-5.8	8.1	16.5	.399	.881	.00793	-.00112	.00087

Table 13. Continued

(c) $\rho = 0.006$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.55$

RUN	76								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2174	.0	-2.7	1.1	4.0	.152	.751	.00440	.00007	.00016
2175	.0	-3.2	1.6	6.0	.151	.750	.00611	.00005	.00022
2176	.0	-4.0	1.9	8.0	.151	.749	.00782	.00005	.00031
2177	.0	-4.7	2.2	9.9	.151	.750	.00941	.00002	.00042
2178	.1	-5.5	2.5	12.0	.151	.750	.01097	.00000	.00056
2179	.1	-6.5	2.7	14.0	.152	.751	.01241	-.00007	.00074
2180	.0	-4.9	2.0	10.0	.149	.748	.00947	.00004	.00043
2181	-1.8	-4.7	2.1	10.0	.152	.751	.00902	-.00024	.00045
2182	-1.8	-5.5	2.5	12.0	.151	.750	.01057	-.00033	.00059
2183	-1.8	-6.3	2.9	14.0	.154	.751	.01202	-.00045	.00076
2184	-1.8	-3.8	1.9	8.0	.154	.751	.00746	-.00017	.00034
2185	-1.8	-2.9	1.7	6.0	.154	.750	.00576	-.00011	.00026
2186	-1.8	-2.2	1.4	4.0	.154	.750	.00409	-.00005	.00020
2187	-5.0	-2.1	1.2	4.0	.153	.751	.00332	-.00019	.00021
2188	-5.0	-2.6	1.7	6.0	.151	.749	.00501	-.00035	.00028
2189	-5.0	-3.3	1.9	7.9	.149	.748	.00661	-.00049	.00036
2190	-5.0	-4.1	2.2	10.0	.150	.749	.00823	-.00065	.00048
2191	-5.0	-4.8	2.6	12.0	.151	.749	.00983	-.00083	.00062
2192	-5.0	-5.5	2.8	14.0	.151	.749	.01125	-.00099	.00079
2193	-5.0	-5.9	3.0	14.9	.152	.749	.01192	-.00109	.00089
2194	-6.2	-1.4	3.2	6.0	.301	.849	.00336	-.00015	.00024
2195	-6.2	-2.3	4.0	7.9	.303	.848	.00498	-.00037	.00032
2196	-6.2	-3.3	4.8	10.0	.303	.848	.00655	-.00059	.00042
2197	-6.2	-4.4	5.5	12.0	.302	.848	.00806	-.00081	.00054
2198	-6.2	-5.4	6.3	14.0	.302	.848	.00943	-.00103	.00070
2199	-6.2	-6.6	7.1	16.0	.301	.847	.01054	-.00128	.00093
2200	-8.0	-4.0	5.3	12.0	.302	.848	.00728	-.00093	.00056
2201	-8.0	-5.0	6.1	14.0	.302	.848	.00875	-.00120	.00072
2202	-8.0	-6.2	6.7	16.0	.303	.847	.01000	-.00146	.00093
2203	-8.0	-4.0	5.3	12.0	.302	.848	.00729	-.00092	.00056
2204	-8.0	-3.0	4.5	9.9	.304	.849	.00575	-.00065	.00043
2205	-8.0	-2.0	3.7	8.0	.302	.848	.00420	-.00040	.00032
2206	-8.0	-1.0	2.8	6.0	.302	.846	.00259	-.00014	.00022
2207	.1	-2.1	3.7	5.9	.306	.848	.00601	.00014	.00015
2208	.1	-3.1	4.6	7.9	.305	.847	.00768	.00009	.00020
2209	.0	-4.2	5.5	10.0	.307	.847	.00922	-.00001	.00031
2210	.0	-5.3	6.4	12.0	.304	.847	.01053	-.00013	.00045
2211	.0	-6.4	7.2	14.0	.306	.846	.01179	-.00028	.00065
2212	.0	-7.8	8.0	16.0	.305	.847	.01269	-.00048	.00090

Table 13. Continued

(c) Continued

RUN	77								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2216	-1.7	-3.5	1.7	6.9	.152	.754	.00657	-.00015	.00026
2217	-1.7	-3.5	1.7	7.0	.150	.753	.00662	-.00015	.00026
2218	-2.8	-3.3	2.6	7.2	.203	.787	.00653	-.00026	.00026
2219	-2.8	-3.2	2.6	7.2	.201	.786	.00653	-.00025	.00025
2220	-4.6	-3.2	3.6	8.3	.252	.819	.00659	-.00042	.00031
2221	-4.6	-3.2	3.6	8.4	.253	.820	.00660	-.00042	.00031
2222	-5.6	-3.3	4.2	9.2	.283	.840	.00654	-.00053	.00035
2223	-5.6	-3.3	4.2	9.2	.282	.840	.00655	-.00053	.00035
2224	-5.6	-3.3	4.3	7.2	.282	.840	.00436	-.00038	.00027
2225	-5.6	-3.3	4.3	8.2	.282	.840	.00544	-.00047	.00031
2226	-5.6	-3.3	4.2	9.2	.282	.839	.00655	-.00053	.00035
2227	-5.6	-3.3	4.2	10.2	.283	.840	.00758	-.00058	.00040
2228	-5.6	-3.3	4.2	11.2	.280	.838	.00865	-.00060	.00045
2230	-5.6	-5.3	4.2	9.2	.283	.840	.00594	-.00064	.00038
2231	-5.6	-4.3	4.3	9.2	.282	.839	.00621	-.00058	.00037
2232	-5.6	-3.3	4.3	9.3	.282	.839	.00656	-.00054	.00036
2233	-5.6	-2.3	4.2	9.3	.282	.839	.00687	-.00048	.00035
2234	-5.6	-1.4	4.2	9.2	.282	.839	.00717	-.00042	.00033
2235	-5.6	-3.3	2.3	9.3	.282	.839	.00728	-.00043	.00034
2236	-5.6	-3.3	3.3	9.2	.284	.840	.00688	-.00050	.00035
2237	-5.6	-3.3	4.3	9.2	.283	.840	.00648	-.00054	.00036
2238	-5.6	-3.3	5.3	9.2	.284	.840	.00614	-.00058	.00037
2239	-5.6	-3.4	6.3	9.2	.282	.839	.00577	-.00062	.00037
2240	-6.3	-3.3	4.7	9.9	.303	.853	.00651	-.00060	.00039
2243	-6.3	-3.3	4.7	9.9	.302	.852	.00654	-.00060	.00040
2244	-8.6	-3.6	6.0	12.4	.350	.885	.00650	-.00083	.00055
2245	-8.6	-3.6	6.0	12.4	.351	.885	.00649	-.00083	.00055
2246	-5.7	-3.3	4.2	9.2	.283	.838	.00648	-.00054	.00036

Table 13. Continued

(c) Concluded

RUN	78								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2250	-8.5	-3.8	5.9	12.5	.350	.887	.00651	-.00082	.00055
2251	-8.5	-3.8	6.0	10.5	.351	.887	.00431	-.00054	.00041
2252	-8.5	-3.7	6.0	11.5	.350	.886	.00542	-.00069	.00048
2253	-8.5	-3.7	5.9	12.5	.351	.887	.00650	-.00080	.00054
2254	-8.5	-3.7	5.9	13.5	.351	.887	.00762	-.00089	.00061
2255	-8.5	-3.7	6.0	14.5	.350	.886	.00870	-.00095	.00070
2256	-8.6	-5.7	6.0	12.4	.350	.886	.00575	-.00085	.00055
2257	-8.5	-4.7	6.0	12.5	.352	.886	.00613	-.00083	.00055
2258	-8.5	-3.8	6.0	12.5	.352	.886	.00651	-.00080	.00055
2259	-8.5	-2.7	6.0	12.5	.352	.886	.00692	-.00076	.00054
2260	-8.5	-1.7	6.0	12.5	.351	.886	.00730	-.00071	.00053
2261	-8.5	-3.8	4.0	12.6	.352	.886	.00744	-.00074	.00054
2262	-8.5	-3.8	5.0	12.5	.350	.885	.00692	-.00077	.00054
2263	-8.5	-3.7	6.0	12.5	.350	.885	.00652	-.00080	.00055
2264	-8.5	-3.8	7.0	12.4	.351	.886	.00599	-.00081	.00055
2265	-8.6	-3.7	8.0	12.4	.349	.885	.00567	-.00083	.00055
2266	-10.0	-3.9	6.6	14.0	.373	.901	.00649	-.00094	.00066
2267	-10.0	-3.9	6.6	14.0	.374	.900	.00654	-.00095	.00066
2268	-10.0	-3.9	6.6	12.0	.372	.900	.00435	-.00063	.00049
2269	-10.0	-3.9	6.6	13.0	.373	.901	.00539	-.00080	.00057
2270	-10.0	-3.9	6.6	14.0	.373	.901	.00652	-.00095	.00066
2271	-10.0	-3.9	6.6	15.0	.373	.901	.00758	-.00107	.00074
2272	-10.0	-3.9	6.6	16.0	.373	.901	.00865	-.00116	.00084
2273	-10.0	-5.9	6.6	14.0	.372	.900	.00574	-.00099	.00065
2274	-10.0	-4.9	6.6	14.0	.372	.900	.00613	-.00098	.00066
2275	-10.0	-3.9	6.6	14.0	.372	.900	.00653	-.00095	.00066
2276	-10.0	-2.9	6.6	14.0	.372	.899	.00690	-.00092	.00066
2277	-10.0	-1.9	6.6	14.0	.372	.899	.00731	-.00088	.00065
RUN	80								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2293	-9.9	-4.0	6.6	14.0	.373	.896	.00639	-.00092	.00065
2294	-9.9	-4.0	4.6	14.0	.373	.897	.00727	-.00088	.00064
2298	-9.9	-4.0	6.6	14.0	.373	.896	.00640	-.00090	.00065
2299	-9.9	-4.0	7.5	14.0	.372	.896	.00607	-.00092	.00065
2300	-9.9	-4.0	8.5	13.9	.371	.895	.00566	-.00092	.00065
2301	-11.4	-4.6	7.4	16.0	.397	.913	.00663	-.00109	.00081

Table 13. Concluded

(d) $\rho = 0.009$ slug/ft^3; $M_T = 0.65$; $\gamma = 9.55$

RUN	96								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2833	.0	-1.5	1.1	1.9	.149	.749	.00188	.00011	.00014
2834	.1	-2.2	1.2	4.0	.149	.749	.00349	.00008	.00015
2835	.1	-3.0	1.4	6.0	.149	.747	.00506	.00005	.00019
2836	.1	-3.8	1.5	8.0	.148	.747	.00659	.00003	.00026
2837	.1	-4.5	1.6	9.9	.147	.747	.00807	.00001	.00034
2838	-1.8	-4.3	1.5	9.9	.147	.747	.00769	-.00023	.00036
2839	-1.8	-4.7	1.6	11.0	.147	.747	.00839	-.00027	.00041
2840	-1.8	-3.6	1.4	8.0	.148	.747	.00622	-.00017	.00027
2841	-1.8	-2.8	1.4	6.0	.149	.748	.00473	-.00010	.00021
2842	-1.8	-2.0	1.3	4.0	.151	.749	.00318	-.00003	.00016
2843	-1.8	-1.3	1.2	2.0	.151	.749	.00161	.00005	.00015
2844	-5.0	-1.7	1.2	4.0	.150	.749	.00258	-.00014	.00017
2845	-5.0	-2.4	1.3	6.0	.151	.751	.00408	-.00030	.00022
2846	-5.0	-3.2	1.4	8.0	.148	.749	.00556	-.00044	.00029
2847	-5.0	-4.0	1.5	9.9	.148	.749	.00700	-.00060	.00039
2848	-5.0	-4.4	1.5	11.0	.146	.747	.00771	-.00067	.00044
2849	-5.0	-4.8	1.6	12.0	.147	.748	.00839	-.00075	.00050
2850	-6.2	.2	3.0	6.0	.298	.848	.00232	.00003	.00020
2851	-6.2	-.9	3.6	8.0	.299	.847	.00380	-.00020	.00025
2852	-6.2	-2.1	4.2	9.9	.300	.847	.00526	-.00042	.00033
2853	-6.2	-3.3	4.8	12.0	.300	.847	.00664	-.00065	.00042
2854	-6.2	-3.3	4.8	12.0	.300	.847	.00662	-.00065	.00042
2855	-6.3	-3.9	5.1	13.0	.300	.847	.00730	-.00077	.00048
2856	-6.3	-4.5	5.3	13.9	.300	.846	.00797	-.00089	.00054
2857	-8.0	-3.1	4.5	12.0	.300	.847	.00599	-.00075	.00044
2858	-8.0	-4.3	5.1	14.0	.300	.847	.00734	-.00103	.00056
2859	-8.0	-1.9	3.9	9.9	.299	.846	.00463	-.00049	.00034
2860	-8.0	-.7	3.4	8.0	.299	.846	.00318	-.00024	.00025
2861	-8.0	.4	2.7	6.0	.298	.845	.00168	.00003	.00018
2862	.0	-3.0	1.4	6.0	.148	.747	.00493	.00000	.00019
RUN	97								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2866	-9.2	-.3	4.5	10.0	.348	.882	.00330	-.00020	.00031
2867	-9.2	-1.5	5.1	12.0	.348	.882	.00465	-.00049	.00041
2868	-9.2	-2.2	5.5	13.0	.349	.881	.00532	-.00064	.00047
2869	-9.2	-2.9	5.7	14.0	.348	.881	.00595	-.00080	.00054

Table 14. Rotor Performance Data for Advanced Elastic Blade Set With Nonstructural Mass Added With $M_T = 0.65$, $\gamma = 9.55$, and $\rho = 0.006$ slug/ft^3

(a) Five masses added at 60-percent-radius station

RUN	91								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2693	-1.7	-3.5	1.7	7.0	.150	.747	.00661	-.00012	.00028
2694	-2.0	-3.7	1.6	7.1	.151	.748	.00658	-.00016	.00029
2695	-2.0	-3.7	1.6	7.1	.151	.746	.00663	-.00017	.00029
2696	-2.8	-3.3	2.6	7.3	.202	.782	.00657	-.00023	.00028
2697	-3.2	-3.4	2.5	7.4	.203	.781	.00657	-.00027	.00029
2698	-3.3	-3.4	2.5	7.5	.200	.779	.00663	-.00028	.00029
2699	-4.5	-3.2	3.6	8.4	.252	.813	.00663	-.00039	.00033
2700	-4.9	-3.4	3.5	8.6	.252	.813	.00665	-.00044	.00035
2701	-4.9	-3.4	3.5	8.6	.252	.812	.00665	-.00044	.00035
2702	-5.6	-3.3	4.3	9.3	.281	.832	.00657	-.00050	.00037
2703	-5.9	-3.5	4.2	9.5	.282	.832	.00660	-.00056	.00039
2704	-5.9	-3.5	4.2	9.5	.281	.831	.00659	-.00056	.00039
2705	-6.3	-3.3	4.7	10.0	.301	.849	.00657	-.00059	.00041
2706	-6.6	-3.5	4.8	10.2	.301	.848	.00655	-.00064	.00042
2707	-6.6	-3.5	4.8	10.2	.300	.847	.00655	-.00064	.00042
2708	-8.5	-3.7	6.0	12.5	.349	.880	.00664	-.00083	.00057
2709	-8.8	-3.7	6.0	12.5	.349	.880	.00652	-.00084	.00057
2710	-8.8	-3.7	6.0	12.5	.349	.880	.00652	-.00085	.00057
2711	-10.0	-3.9	6.6	14.0	.371	.894	.00669	-.00099	.00067
2712	-9.7	-4.0	6.6	13.8	.370	.894	.00658	-.00095	.00065
2713	-9.7	-4.0	6.6	13.8	.371	.894	.00660	-.00096	.00065
2714	-11.5	-4.2	7.3	15.5	.396	.911	.00645	-.00108	.00078
2715	-11.5	-4.2	7.3	15.5	.396	.911	.00644	-.00109	.00078

Table 14. Concluded

(b) Three masses added at 60-percent-radius station

RUN	94								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2766	-1.5	-3.7	1.6	7.0	.150	.750	.00669	-.00011	.00027
2767	-1.5	-3.7	1.6	7.0	.151	.750	.00671	-.00012	.00027
2768	-2.6	-3.5	2.5	7.3	.203	.784	.00666	-.00022	.00027
2769	-2.6	-3.5	2.5	7.3	.202	.783	.00668	-.00022	.00027
2770	-4.3	-3.5	3.4	8.4	.251	.815	.00670	-.00039	.00032
2771	-4.3	-3.5	3.4	8.4	.251	.814	.00672	-.00038	.00032
2772	-5.4	-3.6	4.2	9.4	.280	.834	.00672	-.00051	.00037
2773	-5.4	-3.6	4.2	9.4	.281	.834	.00673	-.00051	.00037
2774	-6.2	-3.6	4.6	10.1	.301	.847	.00667	-.00059	.00041
2775	-6.2	-3.6	4.6	10.1	.301	.847	.00666	-.00059	.00041
2776	-8.4	-3.9	5.9	12.5	.348	.879	.00667	-.00081	.00057
2777	-8.4	-3.9	5.9	12.5	.348	.879	.00666	-.00081	.00056
2778	-9.5	-4.1	6.6	13.8	.370	.893	.00662	-.00091	.00065
2779	-9.5	-4.1	6.6	13.8	.372	.894	.00663	-.00092	.00065
2780	-11.2	-4.5	7.3	15.6	.396	.911	.00660	-.00106	.00079
2781	-11.2	-4.5	7.3	15.6	.397	.911	.00659	-.00106	.00079
2782	-1.5	-3.8	1.6	7.0	.152	.747	.00675	-.00012	.00027

(c) Seven masses added at 60-percent-radius station

RUN	98								
POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2874	-2.0	-3.5	1.5	6.8	.154	.751	.00643	-.00015	.00027
2875	-2.0	-3.5	1.5	6.8	.153	.751	.00643	-.00015	.00026
2876	-3.3	-3.3	2.3	7.2	.202	.783	.00644	-.00027	.00027
2877	-3.3	-3.3	2.3	7.2	.201	.782	.00644	-.00027	.00027
2878	-5.0	-3.3	3.2	8.3	.252	.816	.00642	-.00043	.00032
2879	-5.0	-3.3	3.2	8.3	.252	.816	.00644	-.00043	.00032
2880	-6.1	-3.3	4.0	9.2	.281	.835	.00644	-.00054	.00037
2881	-6.1	-3.3	4.0	9.2	.281	.835	.00644	-.00054	.00037
2882	-6.9	-3.4	4.4	10.0	.302	.849	.00647	-.00061	.00042
2883	-6.9	-3.4	4.4	10.0	.302	.849	.00647	-.00061	.00042
2884	-9.2	-3.6	5.7	12.5	.350	.881	.00650	-.00083	.00057
2886	-10.3	-3.8	6.4	13.8	.371	.896	.00648	-.00094	.00066
2887	-10.3	-3.8	6.4	13.8	.371	.896	.00648	-.00093	.00066
2890	-11.9	-4.1	7.1	15.7	.398	.913	.00653	-.00111	.00080

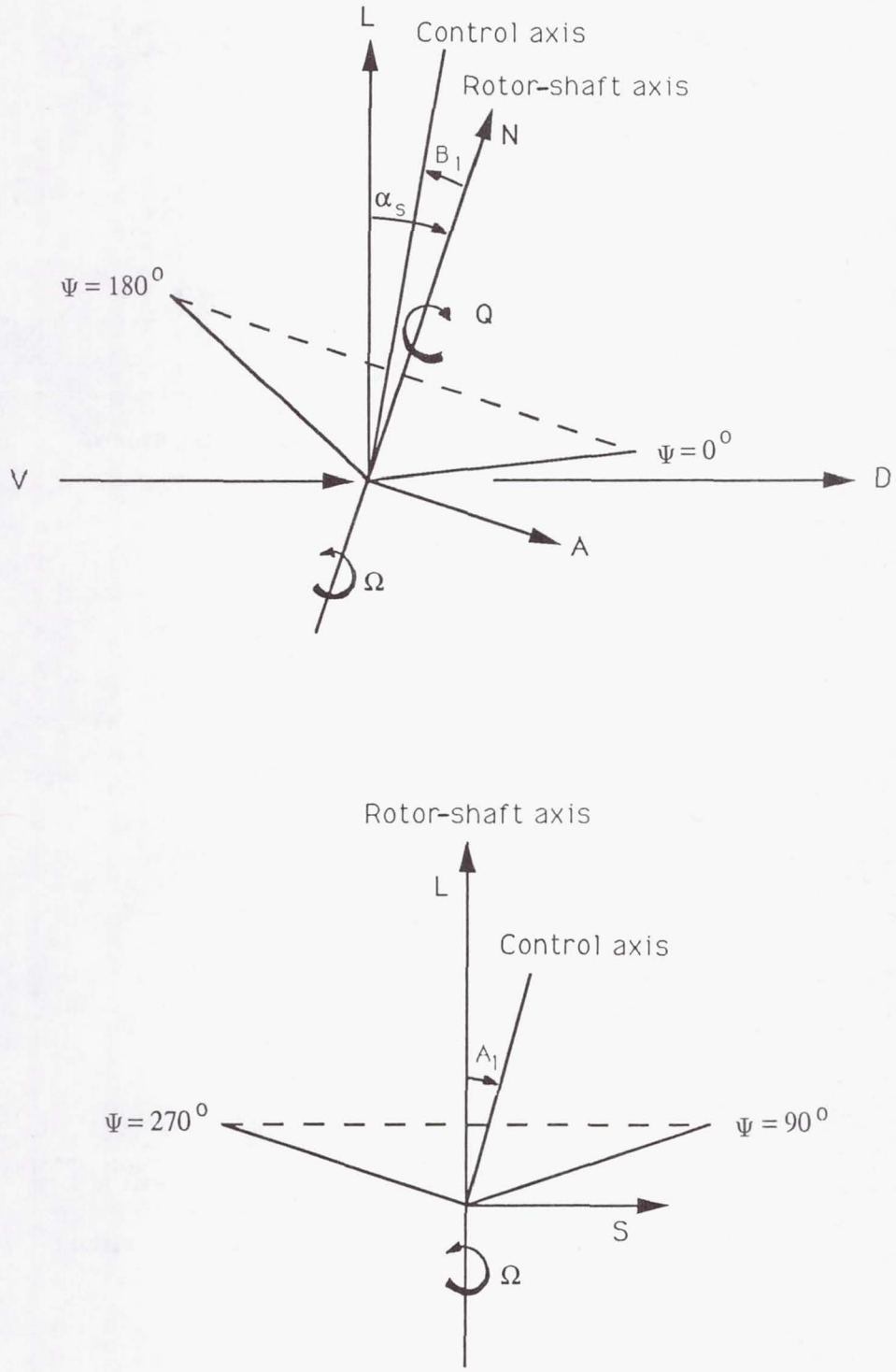
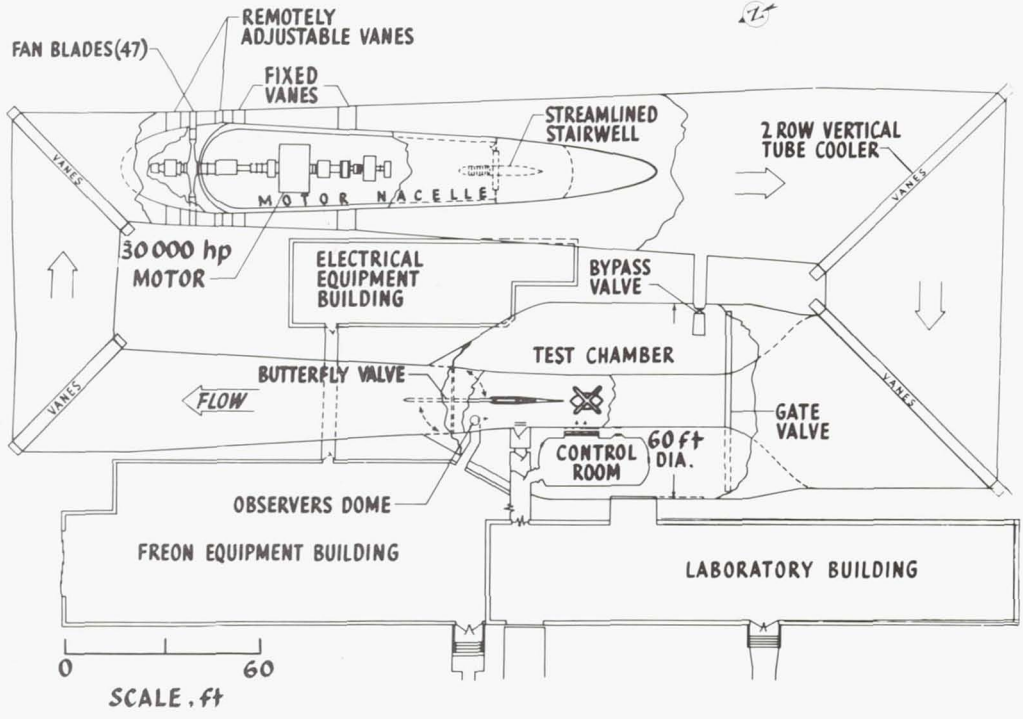
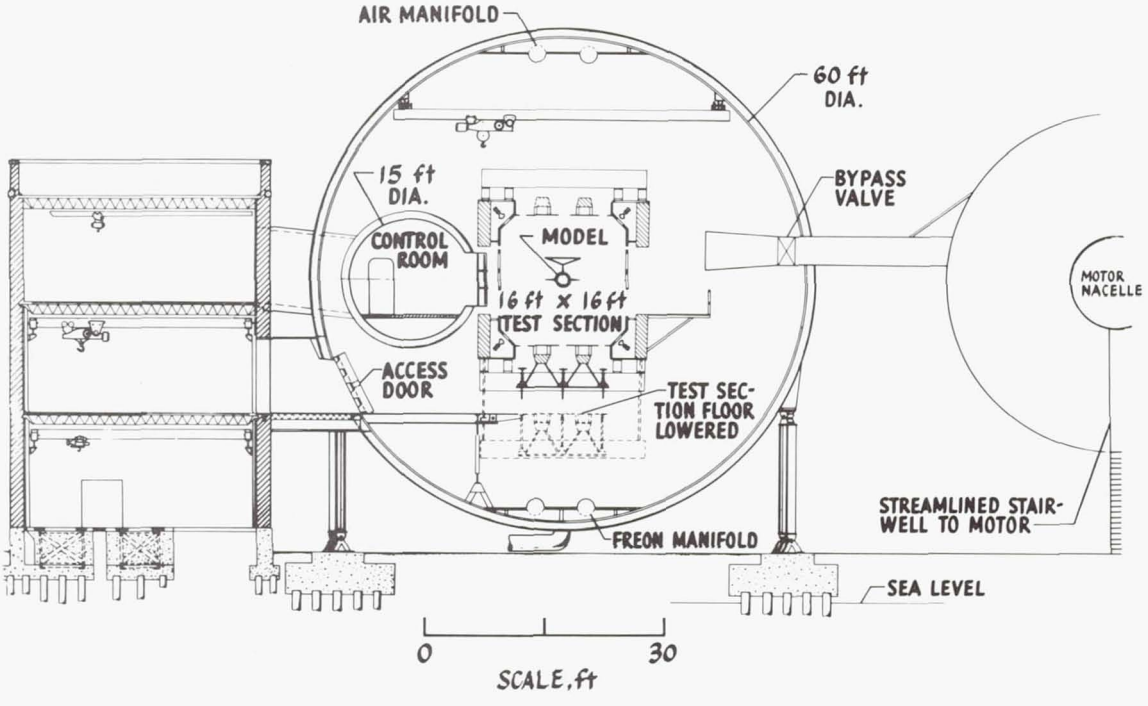


Figure 1. Notation showing positive directions of forces, angles, and velocities.



(a) Top view.



(b) Cross-sectional view.

Figure 2. The Langley Transonic Dynamics Tunnel (TDT).

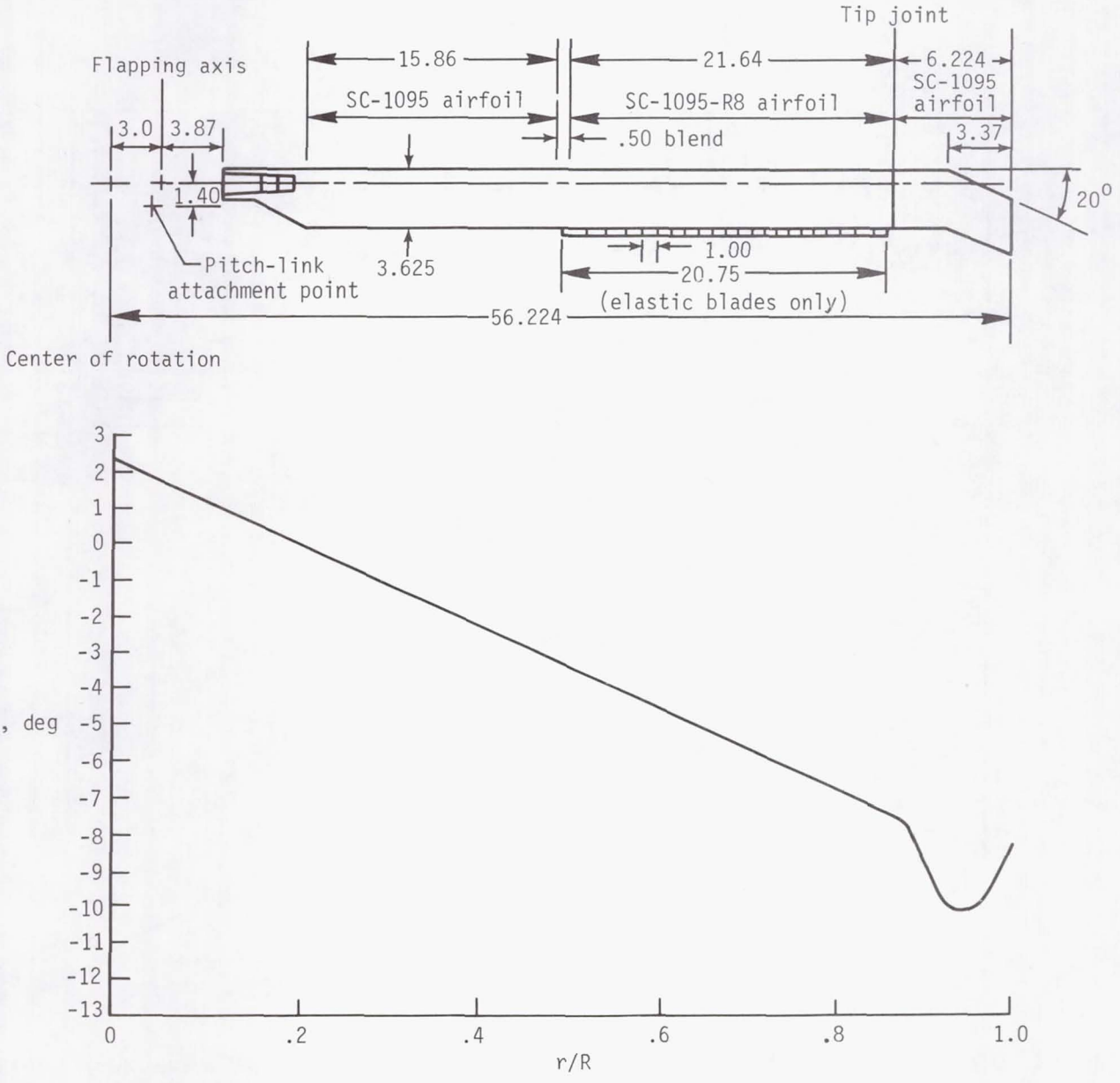


Figure 3. Baseline rotor-blade geometry and built-in twist distribution. Linear dimensions are given in inches.

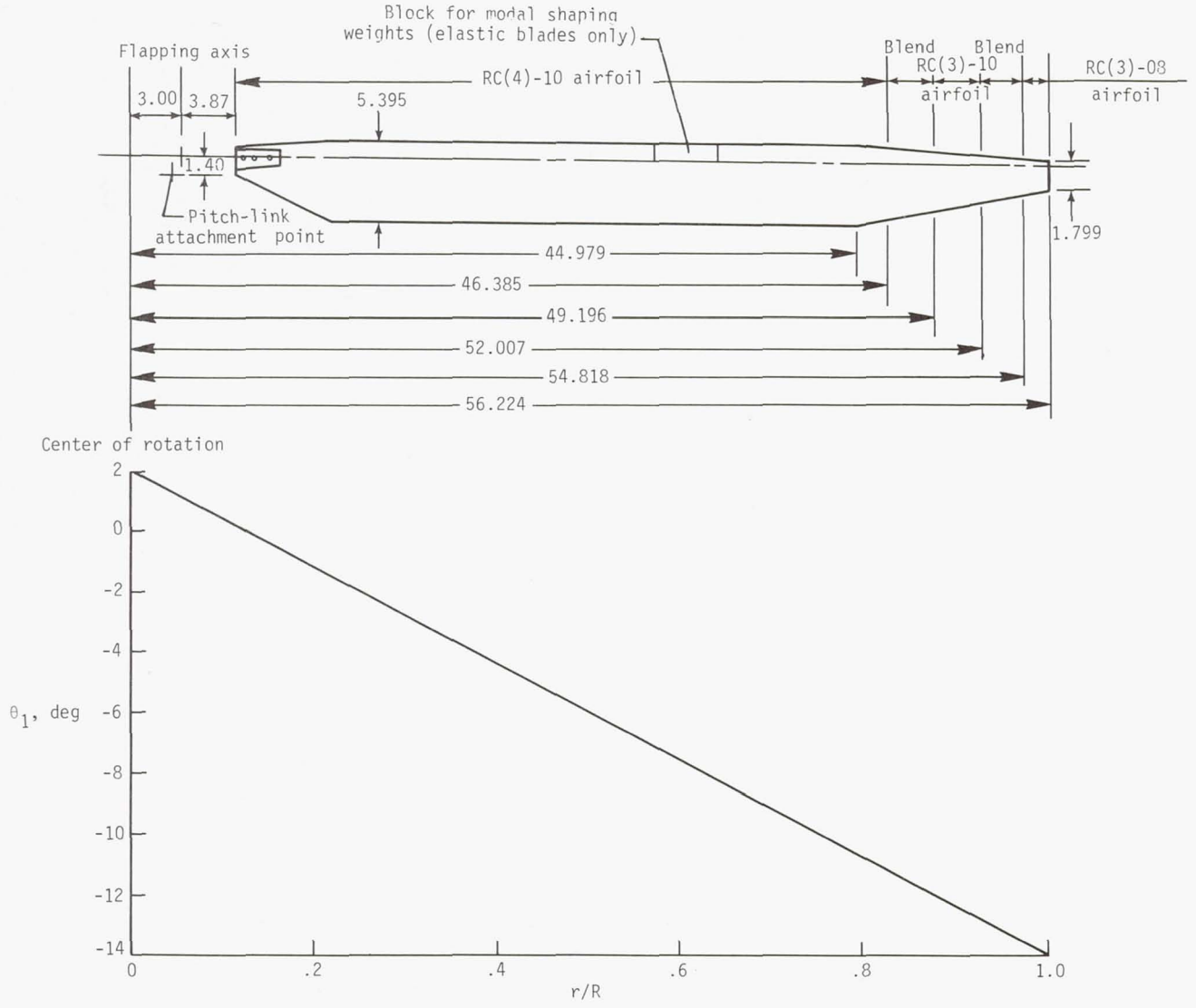


Figure 4. Advanced rotor-blade geometry and built-in twist distribution. Linear dimensions are given in inches.

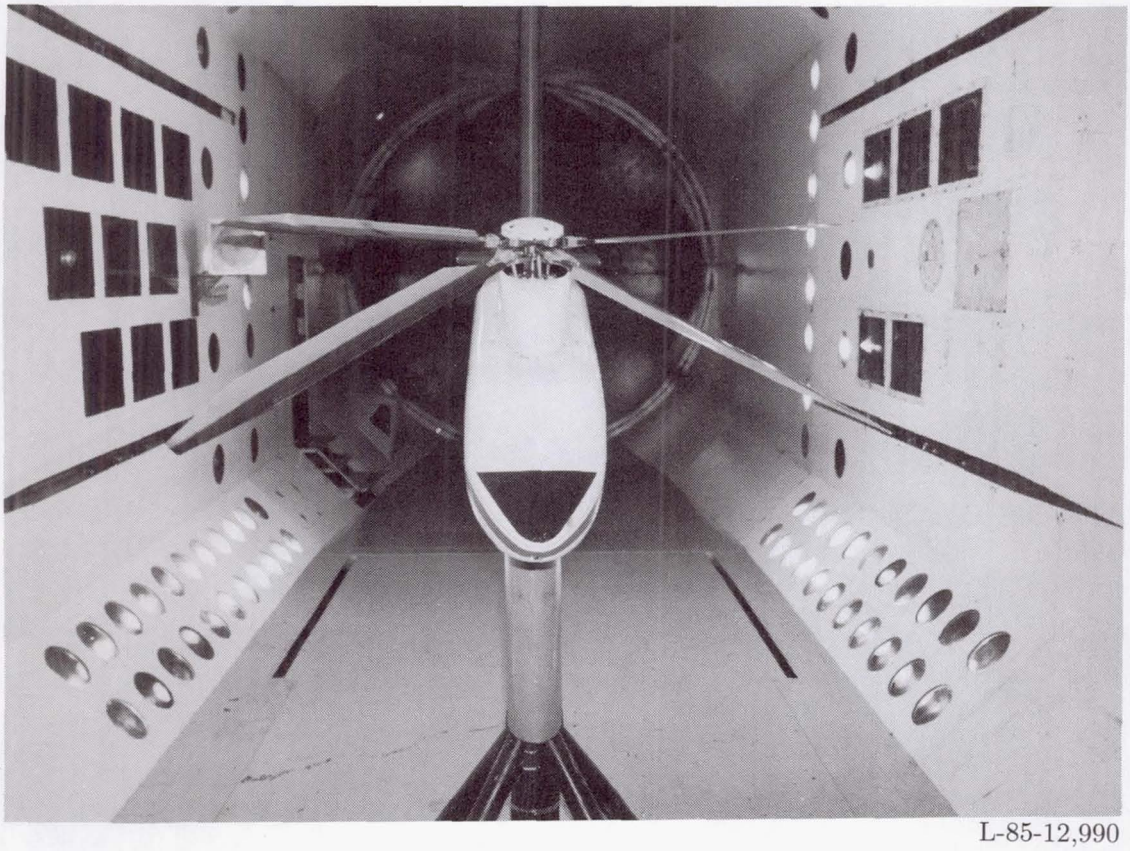


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Figure 5. Aeroelastic rotor experimental system (ARES) model in the Langley Transonic Dynamics Tunnel.

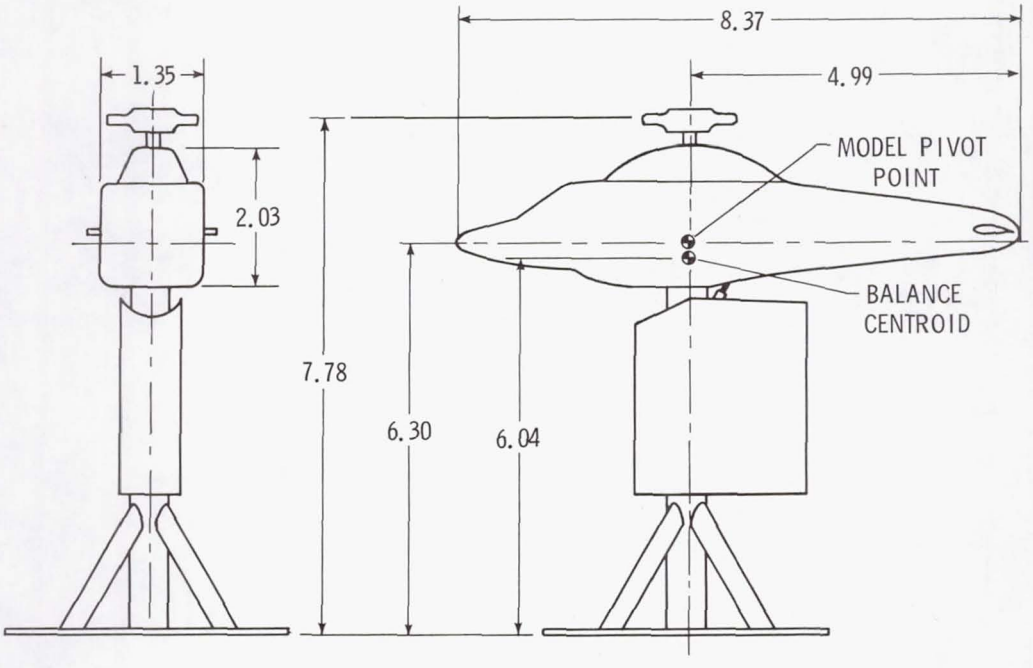

Figure 6. Schematic of aeroelastic rotor experimental system (ARES) model. All dimensions are given in feet.

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National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-4183 AVSCOM-TM-90-B-004		

4. Title and Subtitle	5. Report Date
Performance Data From a Wind-Tunnel Test of Two Main-Rotor Blade Designs for a Utility-Class Helicopter	June 1990
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Jeffrey D. Singleton, William T. Yeager, Jr., and Matthew L. Wilbur	L-16736
9. Performing Organization Name and Address	10. Work Unit No.
Aerostructures Directorate USAARTA-AVSCOM Langley Research Center Hampton, VA 23665-5225	505-63-51-03
	11. Contract or Grant No.
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Aeronautics and Space Administration Washington, DC 20546-0001 and U.S. Army Aviation Systems Command St. Louis, MO 63120-1798	Technical Memorandum
	14. Army Project No.
	1L162211A47AB

15. Supplementary Notes

Jeffrey D. Singleton, William T. Yeager, Jr., and Matthew L. Wilbur: Aerostructures Directorate, USAARTA-AVSCOM, Hampton, Virginia.

16. Abstract

An investigation was conducted in the Langley Transonic Dynamics Tunnel to evaluate an advanced main rotor designed for use on a utility-class helicopter, specifically the U.S. Army UH-60A Black Hawk. This rotor design incorporated advanced twist, airfoil cross sections, and geometric planform. For evaluation purposes, the current UH-60A main rotor was also tested and is referred to as the baseline blade set. A total of four blade sets were tested. One blade set of the baseline rotor and one of the advanced rotor were dynamically scaled to represent a full-scale helicopter rotor-blade design. The remaining advanced and baseline blade sets were not dynamically scaled so that the effects of structural elasticity could be isolated and studied. The investigation was conducted in hover and at rotor advance ratios ranging from 0.15 to 0.4 at a range of nominal test-medium densities from 0.00238 to 0.009 slug/ft^3. This range of densities, coupled with varying rotor lift and propulsive force, allowed for the simulation of several combinations of vehicle gross weight and density altitude. Performance data are presented for all blade sets without analysis; however, cross-referencing of data with flight condition may be useful to the analyst for validating aeroelastic theories and design methodologies as well as for evaluating advanced-design parameters.

17. Key Words (Suggested by Authors(s))	18. Distribution Statement
Helicopters Model rotor testing Helicopter rotor performance	Unclassified—Unlimited Subject Category 05

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	80	A05

For sale by the National Technical Information Service, Springfield, Virginia 22161-2171