UCRL-ID-126137

HA

Reactor Thrust During Boost in a Low Altitude Trajectory

J. H. Moyer

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED.

prator

December 14, 1962

his is an informal report intended primarily for internal or limited external istribution. The opinions and conclusions stated are those of the author and may may not be those of the Laboratory.

ork performed under the auspices of the U.S. Department of Energy by the awrence Livermore National Laboratory under Contract W-7405-ENG-48.



DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Naval	Appl	Lications Memo	No. 15.				
TO:	•	Distribution			December 14	1962 -	
FROM:	*	J. H. Moyer		DECLAS	SUICATIC		
SUBJEC	T:	Reactor Thrust	During	Boost in a L	ow Altitude Tr	ajectory.	

COPP-62-64

This memorandum forms a sequel to NAM No. 12. The same calculations reported there have been done for a typical low altitude trajectory, shown in Figure 1. The reader is referred to NAM No. 12 for a discussion of the method. However, a few ground rules are worth repeating to aid interpretation.

- 1. The assumption is made that the flow rate through the inlet exactly matches that demanded by the reactor and nozzle at all times.
- 2. The fuel element maximum wall temperature is assumed constant at 2500°F from time zero. This means that the values plotted in Figure 2 at any given time are true only if design temperature has been achieved by that time.
- 3. Values of F_{jnet} and C_{fnet} in Figure 2 are 7.3% less than the machine-computed values, to allow for losses not included in the code. They may be compared directly with the corresponding numbers in Tory II-C Memo No. 407.
- 4. Thrust and thrust coefficient in Figure 2 are true for an unobstructed nozzle. If the nozzle exhaust is deflected to pass the nose of a tandem booster the values plotted must be

reduced.

JAVAL PULLCECTONS MORO TO. 19.

Distribution

December 14, 1962.

To Trefton anconsol.

CODICS. Series

COSB-03-0#

1. 1. Moyer. FROM:

reduced.

Reactor Tarast During Coost in a Low Altibude Trajectory.

SUSTECS:

has been achieved by that time.

However, a few ground rules are worth repeating to aid interpretation. Figure 1. The reader is referred to NAM No. 12 for a discussion of the method. reported there have been done for a typical low altitude trajectory, shown in This memorandum forms a sequel to NAM No. 12. The same calculations

- times. exactly matches that demanded by the reactor and nozzle at all **T** • The assumption is made that the flow rate through the inlat
- in Figure 2 at any given time are true only if design temperature ~ • at 2500 F from time zero. This means that the values plotted 3.* The fuel element maximum will temperature is assumed constant
- numbers in Tory II-C Memo No. 407. the code. They may be compared directly with the corresponding machine-computed values, to allow for losses not included in Values of Finet and Cfnet in Figure 2 are 7.3% less than the <u>}</u>•
- pass the nose of a tandem booster the values plotted must be unobstructed nozzle. If the nozzle exhaust is deflected to ÷۴ Thrust and thrust coefficient in Figure 2 are true for an
- (orep) 1.00 by authonity of CIAL CIAL CIAL 62

NAM No. 15



COPP-62-64

Page 2.

JM:rp

Distribution:

	1/37A	Α.	Lorenz
	2/37A	J.	Hadley
	3/37A	H.	Reynolds
	4/37A	E.	Goldberg
	5/37A	т.	Stubbs
	6/37A	J.	Moyer
	7/37A	Μ.	Mintz
	8/37A	Α.	Cole
	9/37A	Ε.	Sheridan
	10/37A	٧.	Hampel
	11/37A	с.	Barnett
	12/37A	J.	Thomas
	13/37A	Η.	Rodean
14	-19/37A	H.	Reynolds/File
	20/37A	W.	B. Myers
	21/37A	W.	Miller
	22/37A	Ψ.	Wells
	23/37A	Ε.	Platt
	24/37A	C.	Walter
	25/37A	Α.	J. Hodges
	26/37A	R.	S. Cornwall
	27/37A	J.	Kane
	28/37A	Α.	Rothman
	29/37A	Β.	Rubin
	30/37A	H.	McDonald
	31/37A	Α.	Kirschbaum
	32/37A	Ρ.	Neal
	33/37A	J.	G. Wenzel, Lockheed
	34/37A	G.	Helfrich, AEC-SAN
	35/37A	I.	Hoffman, AEC-Washington
	36/37A	Τ.	Merkle .
	37/37A	Μ.	Jester .
	1/6B	Fil	e
	2/6B	Fil	e
	- 1/-		

5/0B	File
3/6в	File
4/бв	File
5/6B	File
б/бв	File



 $\chi \ll 1$



COPP-62-64



The second secon	No. 15.					COPP-62-64	
Constrained in the second distribution of the se				·		Page 4.	•
To be a series of the series o							
Allost Particle 2 Allost Partic							
Provide a local character result fraction is a local character result in the local character result in the local character result is a local c							
Boost Plats Factor Preservation Boost Plats Factor Pl							
Const Pallar Reactor R							
Polost busis Recease Presessive a become a becom							0
Result of the second distribution of the second	- 0-	Ψ		$\overline{}$			40
32 Boost Datas Relactos Embrando 32 Fortanti Entre Entre 32 Fortanti Entre 33 Fortanti Entre 34 Fortanti Entre 35 Fortanti Entre 36 Fortanti Entre 37 Fortanti Entre 38 Fortanti Entre 37 Fortanti Entre 38 Fortanti Entre 55 Fortanti Entre 56 Fortanti Entre 57		\sim			\mathbf{X}		
Poor Plate 2 Poor Plate 2 Po							
Boose Datase Reactors Datase R							
Boost Plass Reactor Dampensate Boost Plass Reactor Fay Rattor Rattor - Fay Rattor Rattor Rattor - Fay Rattor Ratto							
Boost Puste Richtera Programmer Boost Puste Richtera Programmer Boost Puste Richtera Programmer Grunde Verhander (reg. dam in 125, 12-) Grunde Verhander Verh							35
Boosr Parase Reactors Paraserantice Boosr Parase Reactors Paraserantice Reactor is Reactor is rest the is is in the internal is is internal in the internal is is internal is internal is in the internal is is internal is internal is in the internal is is internal i					\sim	n n n	
Boost Paralle Reactors Permanenticors Boost Paralle Reactors Permanenticors Reactor Factors Permanenticors Reactors Permanenticors Reactors Reactors Permanenticors Reactors Reactors Reactors Reactors Reactors Reactors Reactors R						0 / /	•
Boosr Pursue Reactor Descriptions Boosr Pursue Reactor Descriptions Reactor Press Person Reactor Could Reactor From Mathematical Parts From Mathematical Press Annual Control Press From Parts Parts From Parts From Parts From Parts From Parts From Parts Parts From Parts					j i	XXX	
Boost Pullse Reactor Estended between Estendentiums Boost Pullse Reactor Estended by Reactor - possie system Task the score exit Jennum and utums Final Reactor - possie system Final						$\left\{ \right\} $	
Boost Plats Relate 2 Boost Plats Relate 2 Boost Plats Relate 2 Relate 2 Rel			9	୍	٩	2 9 9 V	30
32 Boost Phase Ractor Parterents 2 32 Boost Phase Ractor Parterents 32 Reactor Frey Trop 32 Reactor Frey Trop 33 Reactor Frey Trop 34 Reactor Frey Trop 73 Reactor Frey Trop 74 Reactor Frei Steament 75 Reactor Frei Steament 74 Reactor Frei Steament 75 Reactor Frei Steament 74 Reactor Frei Steament 75 Reactor Frei Steament 7		5 2		\mathbf{X}			
Boost Puise Plactor Paragentance 30 80 80 80 80 80 80 80 80 80 8		N N				\$ 1 1 7	
Bios Plane 2 132 Bios Plane 2 132 Bios Plane 2 132 Reactor Fractor Fractor 132 Reactor Fractor Fractor 132 Reactor Fractor Fractor 133 Reactor Fractor Fractor 135 Reactor Fractor Fractor 137 Reactor Fractor Fractor 138 Reactor Fractor Fractor <t< td=""><td></td><td>2 2</td><td></td><td>\sim</td><td>-</td><td><u> </u></td><td>-</td></t<>		2 2		\sim	-	<u> </u>	-
130 Booser Polaise Reactor: Tory #4 130 Booser Polaise Reactor: Tory #4 130 Raactor: Tory #4 131 Raactor: Tory #4 132 Raactor: Tory #4 131 Raactor: Tory #4 131 Raactor: Tory #4 131 Raactor: Tory #4 131 Raactor: Tory #4 132 Raactor: Tory #4 131 Raactor:				\rightarrow	X		•
Relation: Prist Relation: 30 Prist Relation: 30 Relation: 30 Relation: 31 Relation: 32 Relation: 32 Relation: 33 Relation: 33 Relation: 34 Relation: 35 Relation: 36 Relation: 37 Relation: 38 Relation: 39 Relation: 30 Relation: 31 Relation: 32 Relation: 33 Relation: 34 Relation: 35 Relation: 36 Relation: 37 Relation: 38 Relation: 39 Relation: 30 Relation: 31 Relation: 32 Relation: 33 Relation: 34 Relation: 35 Relation: 36 Relation: 37 Relation: 38 Relation: 39 Relation: 30 Relation: 30 Relation: 30		2 2	<u></u>	· · · · · · · · · · · · · · · · · · ·	S\		25
Boosr Duase Reactor Bereavance Boosr Duase Reactor Bereavance Boosr Duase Reactor Top #0 Nossie Threat Irea Factors Brind : New ± 2500 F(Canstant) End in vist dop/indent (Fcf. a End is vist in the factor and a End is vist in the factor and a Brind is the f		N 2	u -		× \	+ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$	
Roos Plane 3 Reactor 4 Total 4 Reactor 5 Constrained aby Reactor 6 Reactor 7 Reactor 7 Reactor 8 <		6 6	0		* \	<u>b</u>	
Boost Puist Reactor Procession 3.00 3.00 3.00 3.00 5.00					5-1-	<u> </u>	
3) Boost Public Reactor 4) Boost Public Reactor 4) <t< td=""><td><u> </u></td><td>82</td><td></td><td></td><td></td><td>* 1</td><td>, v^</td></t<>	<u> </u>	82				* 1	, v^
The second part of the second pa			b		b		2 .
The second secon							Ĵ.
Print Boose Puiss Reactor 10 3.0 From the second area 3.0 From the second area 8.1, 1, 1, 1, 2500 7 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	$q p \cdot p \cdot q$	2 3					
Boosr Punse Reactor Re	N & to 2 or	7 5					
Soost Pubse Reactor 3.0 Files 3.0 Files 3.0 Files 3.1 Files 4.1 Files 4	4 8 ÷ 2 #	<u>v</u> = 8					*
Poosr Puiss 4 Poosr Puiss 4 Poosr Puiss 4 Reactor exit Reactor exit	22 22	artic					5
Production of the second of th		225					
20057 Duny 20057 Duny 20067 Duny 2007 Commune 2007 Commun		222					_
							-
		See Se	1				
	$\lambda = 2$						0
	S S	3 X V					.~
	•	¥ •• •					
		33					;
	Q	-300					
			•				
							5
							-
							0
			N N			8	
							1

M