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STEADY, OSCILLATORY, AND UNSTEADY SUBSONIC AND SUPERSONIC AERODYNAMICS - PRODUCTION VERSION 1.1 (SOUSSA - P1.1)

VOLUME II - USER/PROGRAMMER MANUAL

ADDENDUM 1 - ANALYTICAL TREATMENT OF WAKE INFLUENCE

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ADDENDUM 1 TO NASA CONTRACTOR REPORT 159131

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PREPARATION OF INPUT - ADDENDUM 1

This report is Addendum 1 to reference 1. In reference 2, equation (3-13) concerns the influence of the trailing wake at each wing-panel center. The effect of the wake is calculated by analyzing the wake as being subdivided into trailing wake strips, with each strip extending downstream from its local segment of trailing edge. With the improved program there are two optional ways of calculating the wake effect, and the choice is controlled by an added parameter KANW that is part of the input data as follows:

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RESET NAM1 = KANW  NWRD = 1  NJ = 1  LB = 1  ITYP = 0 $
(0 or 1)
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For KANW = 0 the older treatment is used that subdivides each necessarily finite wake strip into the number of wake segments given by the parameter NSEI. Wake segments need not be equal in streamwise extent. This choice is applicable to general s-plane motion, including growing and decaying motion, and also to steady boundary condition modes. But this choice also obligates an analyst to consider the adequacy of the downstream extent of the wake for all motion, and the adequacy of the fineness of wake segmentation, especially just aft of wing trailing edge. Note, however, that for steady boundary conditions, only one segment per strip is needed.

For KANW = 1 the newer optional wake treatment applies for simple harmonic and steady boundary condition modes. The wake effect is integrated analytically as extending downstream to infinity. Compared to using KANW = 0 computer use costs are decreased 50 to 60 percent for example oscillatory cases, and there is no need to study the adequacy of wake segmentation and extent.

REFERENCES

1. Smolka, Scott A., Preuss, Robert D., Tseng, Kadin, and Morino, Luigi: Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamic - Production Version 1.1 (SOUSSA P1.1) - Volume II - User/Programmer Manual. NASA CR 159131, June 1980.

2. Morino, Luigi: Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics - Production Version 1.1 (SOUSSA P1.1) - Volume I - Theoretical Manual. NASA CR 159130, January 1980.

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15. Supplementary Notes

This is Addendum 1 to NASA Contractor Report 159131, same title, that was prepared under Contract NAS1-14977.

16. Abstract

NASA Contractor Report 159131 is the User/Programmer Manual for the computer program SOUSSA P1.1 available from COSMIC as program LAR-12433. An improved computer program has been transmitted to COSMIC for distribution. The improvement is an optional analytical treatment of the wake influence on the lifting surface for simple harmonic and steady motion. The present report describes the added input data for accessing this option.

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