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NASA TECH BRIEF

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Algorithm for Nonlinear Stationary Navier-Stokes Problem

A generalized Newton's method is the basis of a new algorithm that may be used to solve the nonlinear, stationary Navier-Stokes problem of fluid dynamics. The algorithm was developed from the viewpoint that practical solutions to problems in fluid dynamics must answer the following questions: (1) Under what conditions does the sequence of functions obtained by Newton's method converge to the solution? (2) How should the initial guess be made, as a function of ν, so as to guarantee convergence? (3) At what rate does the sequence of approximate solutions converge? The algorithm has provided a family of approximate solutions for the Navier-Stokes problem.

The results of applications of the algorithm suggest that it has potential application to a variety of related fluid flow problems, such as the presently intractable separation problem of aerodynamics. Details of the mathematical development, as well as the computation of explicit error estimates, are available.

Note:

Requests for further information may be directed to:

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