Application Of Combined Spectral And Finite Difference Method To Unsteady Viscous Fluid Flow In Conical Domains

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The problem of axisymmetric unsteady self-similar viscous fluid flow in conical domains was considered. Such a formulation allows one to study the process of formation of steady regimes that were found earlier. The problem was reduced to a single fourth-order equation. The solution of the problem behaves regularly in azimuthal direction and irregular in radial direction. Hence combined collocation spectral and finite difference method was employed to solve this problem. Special set of basis functions and collocation points was constructed to match the boundary conditions. Efficiency of the method was confirmed by means of numerical experiment. Examples of unsteady flows were computed. Nontrivial transitions between the initial regimes and steady regimes were observed.