

عنوان مقاله:

A numerical study of electrohydrodynamic flow analysis in a circular cylindrical conduit using orthonormal Bernstein polynomials

محل انتشار:

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خلاصه مقاله:

In this work, the nonlinear boundary value problem in electrohydrodynamics flow of a fluid in an ion-drag configuration in a circular cylindrical conduit is studied numerically. An effective collocation method, which is based on orthonormal Bernstein polynomials is employed to simulate the solution of this model. Some properties of orthonormal Bernstein polynomials are introduced and utilized to narrow down the computation of nonlinear boundary value problem to the solution of algebraic equations. Also, by using the residual correction process, an efficient error estimation is introduced. Graphical and tabular results are presented to investigate the influence of the strength of nonlinearity α and Hartmann electric number Ha^2 on velocity profiles. The significant merit of this method is that it can yield an appropriate level of accuracy even with large values of α and Ha^2 . Compared with recent works, the numerical experiments in this study show a good agreement with the results obtained by using MATLAB solver `bvp4c` and its competitive ability.

کلمات کلیدی:

Electrohydrodynamics flow, Circular cylindrical conduit, Hartmann electric number, Orthonormal Bernstein polynomials

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