عنوان مقاله:

On Efficient Spectral Perturbation Method for Unsteady Boundary-Layer Flows Caused by an Impulsively Stretching Plate

نویسنده:

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خلاصه مقاله:

This investigation extends prior work on the use of perturbation techniques in the solution of unsteady boundary layer flows caused by an impulsively stretching sheet. We propose a spectral method based approach to solve the governing sequence of differential equations generated by the perturbation series approximation. The aim of this study is to demonstrate that, in contrast to conclusions drawn from previous research on this subject, the perturbation approach can be used efficiently to obtain very accurate solutions that are valid on the whole problem domain, in both dimensionless space (۰ η) and time (۰ τ). The applicability of the proposed method, herein after referred to as the spectral perturbation method (SPM), is tested, respectively, on systems of one, two and three previously reported nonlinear partial differential equations that model different versions of unsteady boundary layer flow problems. A residual error analysis is conducted in order to assess the accuracy of the present method. Computational efficiency of the method is demonstrated by comparing with results obtained using the Keller-Box method.

کلمات کلیدی:

Chebychev spectral collocation, Perturbation method, Unsteady boundary layer, box, Keller

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