عنوان مقاله:

Approximate solution of laminar thermal boundary layer over a thin plate heated from below by convection

محل انتشار:

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خلاصه مقاله:

In this paper, an integration of a symbolic power series method - Padé approximation technique (PS - Padé), was utilized to solve a system of nonlineardifferential equations arising from the similarity solution of laminar thermal boundary layer over a flat plate subjected to a convective surface boundarycondition. As both boundary conditions tended to infinity, the combination of series solutions with the Padé approximants was used for handling boundary conditions on the semi-infinite domain of solution. The combination of power series and Padé proposed an alternative approach of solution which did not require small parameters and avoided linearization and physically unrealistic assumptions. The results of the present approach were compared with numerical results as well as those of previous works reported in the literature. The obtained results represented remarkable accuracy in comparison with the numerical ones. Finally, reduced Nusselt number, as an important parameter in heat transfer,was calculated by the obtained analytical solution. The present power series- Padé technique was very simple and effective, which could develop a simpleanalytic solution for flow and heat transfer over the flat plate. The results of the present study could be easily used in practical applications

کلمات کلیدی:

Symbolic power series,Padé, Flat plate, Convective boundary condition