AN ACCURATE NUMERICAL SOLUTION OF A TWO DIMENSIONAL HEAT TRANSFER PROBLEM WITH A PARABOLIC BOUNDARY LAYER

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Abstract A singularly perturbed linear convection-diffusion problem for heat transfer in two dimensions with a parabolic boundary layer is solved numerically. The numerical method consists of a special piecewise uniform mesh condensing in a neighbourhood of the parabolic layer and a standard finite difference operator satisfying a discrete maximum principle. The numerical computations demonstrate numerically that the method is $\va$-uniform in the sense that the rate of convergence and error constant of the method are independent of the singular perturbation parameter $\va$. This means that no matter how small the singular perturbation parameter $\va$ is, the numerical method produces solutions with guaranteed accuracy depending solely on the number of mesh points used.

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