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INITIAL-VALUE TECHNIQUE FOR SINGULARLY PERTURBED TWO-POINT BOUNDARY VALUE PROBLEMS USING DIFFERENTIAL QUADRATURE METHOD

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Abstract

This paper deals with the Initial value technique for finding the numerical solution of linear and nonlinear singularly perturbed two point boundary value problems with a boundary layer at one end (left or right) point using Differential Quadrature Method(DQM). For linear problems the required approximate solution is obtained by solving reduced problem and one initial value problems directly deduced from the given problem. For nonlinear problems the original second-order nonlinear problem is linearized by using quasilinearization method. Then this linear problem is solved as previous method. The Differential Quadrature Method is an efficient descretization technique in solving initial and /or boundary value problems accurately using a considerably small number of grid points. To demonstrate the applicability of the method, we have solved model linear and nonlinear examples and presented the computational results. It is observed that the computed result approximates the exact solution very well with high accuracy and efficiency.

Key Words : Singular perturbation, Ordinary differential equation, Two point boundary value problem, Boundary layer, Initial-value technique, Differential Quadrature Method.

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