Abstracts of MMA2015, May 26–29, 2015, Sigulda, Latvia

NUMERICAL SOLUTION OF THE BURGERS' EQUATION USING TRIGONOMETRIC B-SPLINE GALERKIN METHOD

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The Burgers' equation which was first introduced by Bateman [1] and later treated by Burgers [2]

$$U_t + UU_x - \nu U_{xx} = 0, \tag{1}$$

is one of a few well-known non-linear partial differential equations which can be solved analytically for the restricted set of initial conditions [3], [4]. In the equation, U is the dependent variable, ν is the viscosity parameter, and t and x are the independent variables.

Boundary and initial conditions will be chosen from

$$\begin{array}{l} U(a,t) = \beta_1,\ U(b,t) = \beta_2, \\ U_x(a,t) = U_x(b,t) = 0, \end{array} \quad t \geq 0, \tag{2}$$

and

$$U(x,0) = f(x). \tag{3}$$

In this study, the Burgers' equation will be solved numerically using the Galerkin finite-element method, based on Crank Nicolson method for time integration and quadratic trigonometric B-spline for space integration. The proposed algorithm is tested on the two test problems for the small values of viscosity parameter ν.

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