Advances in Mathematical Sciences and Applications
Vol. 34, No. 2 (2025), pp. 911–930

GAKKOTOSHO
TOKYO JAPAN

AN EFFICIENT FORMULATION OF THE NODAL INTEGRAL METHOD FOR BURGER'S EQUATION SOLUTION

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Abstract. The Nodal Integral Methods (NIMs) are coarse-mesh techniques designed to solve Partial Differential Equations (PDEs) efficiently and accurately. In this paper, we propose a novel formulation of the NIM for solving the one-dimensional viscid time-dependent Burgers' equation. At each time step, the scheme first computes the time-averaged unknowns by solving a nonlinear equation, then calculates the centered-averaged values, from which the novel space-averaged values are derived. These steps are repeated for all nodes in the computational domain. To demonstrate the effectiveness of the proposed method, we applied it to problems with known analytical solutions and compared the results with existing methods from the literature. Numerical experiments indicate that the new scheme achieves higher accuracy while reducing computational time, offering a simplified yet fast and accurate solution approach.

Communicated by Takashi Suzuki; Received June 8, 2025
AMS Subject Classification: 35Q35, 35L65, 65M60.
Keywords: Burgers' equation, nonlinear PDEs, Nodal Integral Method, Modified Nodal Integral Method, Modified Modified Nodal Integral Method.