

The localized method of particular solutions for solving the Burgers' equations via the Cole-Hopf transformation

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The localized method of particular solutions (LMPS) is a meshless numerical method based on the method of particular solutions. The LMPS introduces the localization to palliate ill-conditions and increase efficiency by transforming the system into sparse matrix, while without sacrificing much accuracy. In this paper the high-order finite difference (FD) scheme is used to discretize the time domain, combining the LMPS as the proposed numerical scheme. The proposed meshless numerical model approximates the solution of Burgers' equations dependent on the Cole-Hopf transformation. The Cole-Hopf formula transforms the Burgers' equations into the diffusion equation for solving the initial value problem. Hence the non-linear system of Burgers' equations can be solved by proposed meshless numerical methods. The numerical results will demonstrate the consistent behaviors of the LMPS in solving the Burgers' equations via the Cole-Hopf transformation. The proposed numerical scheme shows good efficiency, high accuracy and robustness, further application into engineering problem can be expected.

Keywords: Meshless numerical method, localization, method of particular solutions, Burgers' equation, the Cole-Hopf transformation.