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Numerical solutions of fluid flow field by using the localized method of approximate particular solutions

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In this study, the two-dimensional incompressible viscous flow fields are simulated by the localized method of approximate particular solutions (LMAPS). For the governing equations of the flow field, the velocity-vorticity formulation is used in order to avoid dealing with the troublesome pressure boundary conditions in primary-variable formulation. The LMAPS and the implicit Euler method are adopted for spatial and temporal discretization. The implicit Euler method can guarantee the stability of time integration and the LMAPS is one kind of newly-developed domain-type meshless methods, which can truly get rid of mesh generation and numerical quadrature. In addition, the dual time scheme is used for analyzing the system of nonlinear algebraic equations at every time steps. Several numerical examples are demonstrated to validate the accuracy and simplicity of the proposed meshless scheme.

Keywords: localized method of approximate particular solutions, velocity-vorticity formulation, implicit Euler method, meshless method