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Incompressible flow simulations on regularized moving meshfree grids.[1] YAROSLAV VASYLIV, ALEXANDER ALEXEEV, Georgia Institute of Technology — A moving grid meshfree solver for incompressible flows is presented. To solve for the flow field, a semi-implicit approximate projection method is directly discretized on meshfree grids using General Finite Differences (GFD) with sharp interface stencil modifications. To maintain a regular grid, an explicit shift is used to relax compressed pseudosprings connecting a star node to its cloud of neighbors. The following test cases are used for validation: the Taylor-Green vortex decay, the analytic and modified lid-driven cavities, and an oscillating cylinder enclosed in a container for a range of Reynolds number values. We demonstrate that 1) the grid regularization does not impede the second order spatial convergence rate, 2) the Courant condition can be used for time marching but the projection splitting error reduces the convergence rate to first order, and 3) moving boundaries and arbitrary grid distortions can readily be handled.

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