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A numerical solution of hyperbolic equations using the PCMFS method CHRISTOPH SCHMITT, Technical University of Munich, ZVI RUSAK, SUVRANU DE, RPI — The numerical solution of the inviscid wave and Burgers equations using the point collocation-based method of finite spheres (PCMFS) [1] is developed. The PCMFS is a meshfree numerical technique for the solution of PDEs on complex domains which uses the moving least squares (MLS) method for spatial discretization. The burden of mesh generation and remeshing in solving propagating shock waves is therefore mitigated. Each MLS shape function is compactly supported on a ball of radius r. Temporal discretization uses a first-order backward difference scheme. Solution accuracy is governed by the spatial stepΔx, the Courant number$C = u_{\max}\Delta t/\Delta x$, and the relative radius$\rho = r/\Delta x$. The solution of the linear wave equation shows that ρ has no significant influence on solution accuracy. As time stepΔt decreases, errors in the form of dissipation reduce and relatively small errors in the form of dispersion appear. As Δxdecreases, dispersion error is significantly reduced and dissipation error is unaffected. The solution of the Burgers equation shows that for$\rho > 3$ dissipation errors dominate while for $\rho < 3$ dispersion error is more significant. For $\rho \to 1$ the solution error is the least. For $C < 1$ dispersion error dominates which is superseded by dissipation error for$C > 1$. A significant observation is that for $C = 1$ a shock wave propagates without dissipation or dispersion errors for$\rho \approx 1$. [1] De et al., *Computers & Structures* 83, (17-18), 1415-1425, 2005.

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