

A Physics Evoked Meshfree Method

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Abstract: In mesh free methods, discrete equations are built according to physics information of micro-bodies arbitrarily spread in vicinal space. As the requirements about topology of micro-bodies are reduced, simulations with Lagrangian approach may be easier even with large distortions. Owing to the insufficiency of topological information, there is a challenge for mesh-free method to reflect physics especially as discontinuities exist. Based on the physical laws and developing trend of numerical simulation, a new mesh free systematic method PECM (Physics Evoked Cloud Method) which has excellent applicability is shown. High fidelity to physics of the method is demonstrated through five 1-dimentional challenging problems in which strong discontinuities exist.

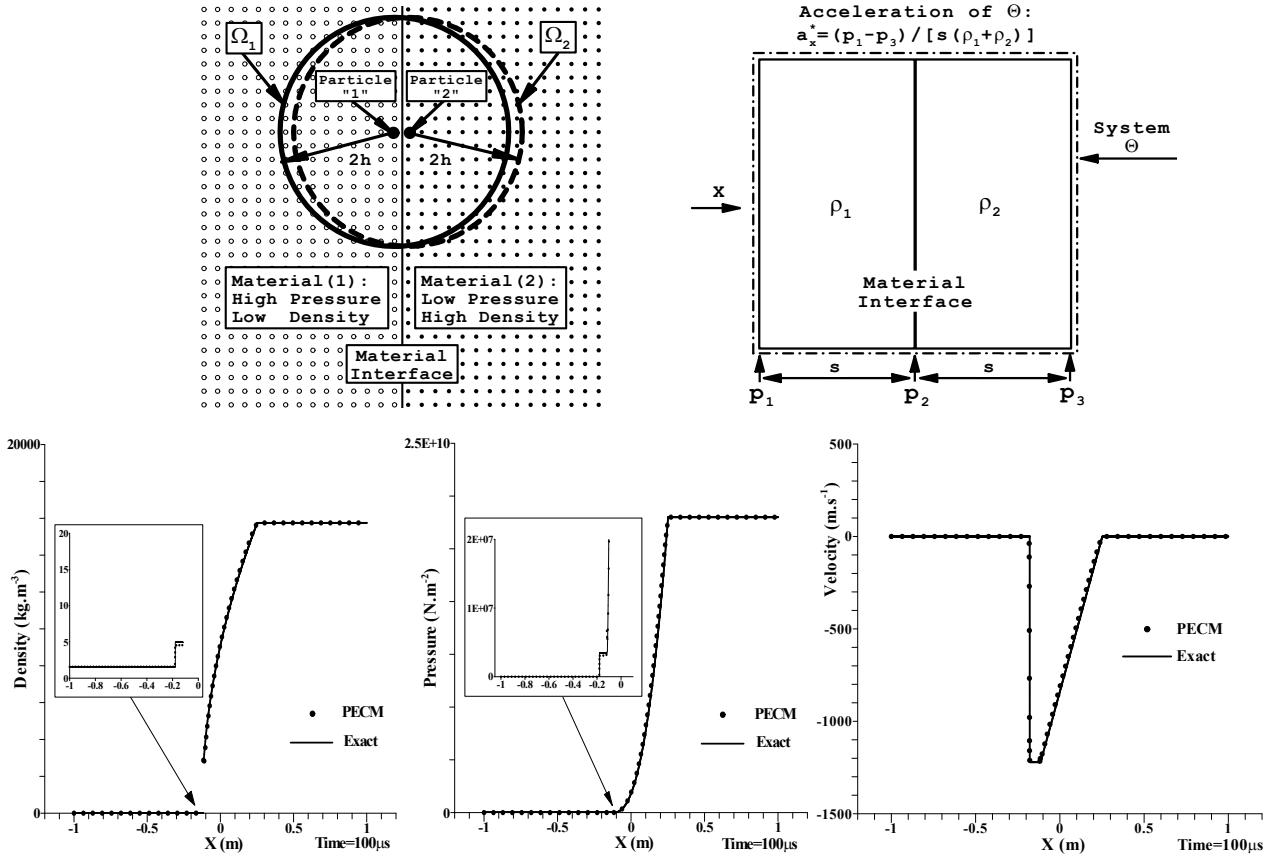


Figure 1: Kernel Modification in PECM (top) & Validation of PECM(down): Numerical results about Case 5

References

- [1] RA Gingold and JJ Monaghan. Kernel estimates as a basis for general particle methods in hydrodynamics. *Journal of Computational Physics*, 46(3):429–453, 1982.
- [2] Leonardo Di G Sigalotti, Hender López, Arnaldo Donoso, Eloy Sira, and Jaime Klapp. A shock-capturing sph scheme based on adaptive kernel estimation. *Journal of Computational Physics*, 212(1):124–149, 2006.