

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Projection Particle Methods - Latest Advances and Future Perspectives ABBAS KHAYYER, Associate Professor, Kyoto University, Japan — This talk comprises of a review on the latest achievements made in the context of projection particle methods. Projection particle methods, including Incompressible Smoothed Particle Hydrodynamics (ISPH) and Moving Particle Semi-implicit (MPS), are founded on Helmholtz-Leray decomposition and its corresponding Chorin's projection method. In this talk this important mathematical concept and related mathematical conditions will be reviewed and its application for ISPH and MPS will be concisely described. Followed by providing the mathematical background, the ISPH and MPS numerical methods will be briefly introduced. The latest achievements corresponding to stability, accuracy and energy conservation enhancements as well as advancements related to simulations of multi-phase flows and hydroelastic fluid-structure interactions will be discussed. In specific, more attention will be dedicated to hydroelastic fluid-structure interactions in the context of projection particle methods, introducing methods for interactions of incompressible fluid flows with elastic structures in both Newtonian and Hamiltonian frameworks. Finally, the future perspectives for further enhancements of applicability and reliability of particle methods will be highlighted.

Abbas Khayyer
Associate Professor, Kyoto University, Japan

Date submitted: 29 Jul 2019

Electronic form version 1.4