Numerical simulation of particle movement by immersed finite element method

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ABSTRACT

Lateral migration of solid particles is a classical topic of fluid-structure interaction problem. Equilibrium position of neutrally buoyant particles in Poiseuille flow was observed by Segre and Silberberg[1]. According to their observation, particles in Poiseuille flow are approached to specific region regardless of their initial position. In this talk, we simulate the motion of a solid particle in shear flow using the immersed finite element method (IFEM) which was developed to efficiently solve fluid-structure interaction problems without remeshing technique. In the IFEM, Lee et al.[2] proposed the directly coupled Euler-Lagrange method (DCELM) to improve the accuracy of IFEM. Using the proposed method, Dirac delta function is replaced to transformed finite element basis functions. The support area of the fluid-structure interaction force is automatically optimized when compared with conventional Dirac delta function. The IFEM is utilized to simulate the lateral migration of particles and the simulation results are fully discussed.

REFERENCES

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