Basic discussion of condition for fluid structure interaction analysis using SPH method

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Particle methods of fluid dynamics have some advantages for safe analyses to defend from natural disasters that are tsunami etc. Those methods are recently applied to simulate the tsunami of the Great East Japan Earthquake and to predict the damage from the tsunami. The smoothed particle hydrodynamics (SPH) method [1] is one of the particle based method.
SPH method is applied to fluid dynamics, solid mechanics and etc. SPH method is recently well-known method for computational mechanics. The SPH method is recently utilized to a number of fields such as the astrophysics and the fluid mechanics, the solid mechanics, and so on. It is sometimes difficult for the finite element method (FEM) to simulate failure phenomena and fracture phenomena such as impact problems. SPH methods are used for fluid dynamics which are complicated fluid structural interaction problems. In fluid structural interaction analyses, if the structures are subjected to the large deformation, the stress may exceed the yield stress in the structures.
 Since the smoothed particle hydrodynamics (SPH) method is a method which is discretized by assemblies of particles which are smoothed by a kernel function, the nodes-elements connectivities are not required. The particle can be dispersed when the failure or the fracture occurs. Therefore the SPH is appropriated to analysis including the failure and the fracture problems.
 It is necessary to simulate fluid dynamics for the fluid structure interaction analysis. In the present analysis, we use the enhanced SPH method for fluid dynamics problem and fluid structure interaction problems. It is confirmed that the precision of the enhanced SPH is higher than that of the standard SPH.

REFERENCES

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