U字管内流の3次元シミュレーション

Three-dimensional simulations of Flows in U-bent Tube

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Flow-induced vibration occurs in Steam generator of Pressure Water Reactor. In order to clarify the mechanism of the vibration, simulation of the interaction among flow, heat and structures is required. We examine the various numerical methods by which unsteady behaviors of incompressible and viscous flows in a U-bent tube with a circular cross-section can be simulated.

Fluid dynamics and fluid-structure interaction in the steam generator of the pressure water reactor (PWR) are analyzed numerically. The 3D flow field is simulated with a finite element method. The vibration of the reactor wall is modeled using a spectral element method. The interaction between the fluid and the structure is solved by coupling the two methods. The results show that the interaction between the flow and the wall vibrations is significant and cannot be neglected.

Fig. 1 Grid system of U-bent Tube