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## Numerical Simulation Method of Thermal Hydraulics in Wire-wrapped Fuel Pin Bundle of Sodium-cooled Fast Reactor

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A numerical simulation system, which consists of a deformation analysis program and three kinds of thermal-hydraulic analysis programs, is being developed in Japan Atomic Energy Agency in order to offer methodologies to clarify thermal-hydraulic phenomena in fuel assemblies of sodium-cooled fast reactors under various operating conditions including fuel deformation. In this paper, we focus on SPIRAL which is one component program of the numerical simulation system and plays the role to simulate detailed local flow and temperature fields in a wire-wrapped fuel pin bundle. SPIRAL adopts finite element method in order to treat complicated geometries and a hybrid turbulence model which has computation efficiency similar to high Re number models and high accuracy similar to low Re number models. As a validation study, SPIRAL was applied to several kinds of analyses of water/sodium experiments using wire-wrapped fuel pin bundles. Applicability of SPIRAL to the prediction of flow and temperature fields as well as pressure loss coefficients will be discussed.

### Country/Int. Organization

Japan

**Primary author:** OHSHIMA, Hiroyuki (Japan Atomic Energy Agency)

**Co-authors:** Dr NISHIMURA, Masahiro (Japan Atomic Energy Agency); Mr IMAI, Yasutomo (NDD Corporation)

**Presenter:** OHSHIMA, Hiroyuki (Japan Atomic Energy Agency)

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