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Thermal- Hydraulic Analysis of Nanofluids as the Coolant in Supercritical Water Reactors

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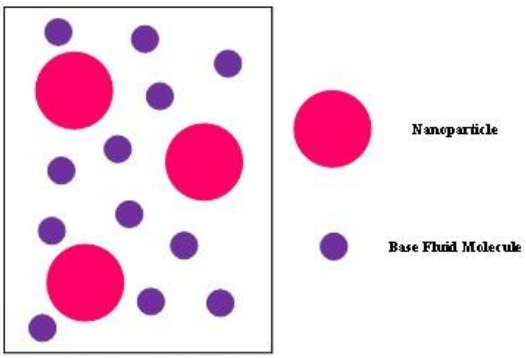
Graphical Abstract



Homogeneous Nanofluid in an arbitrary control volume

Highlights:

- ►Thermal-hydraulic analysis of a SCWR is applied with using a nanofluid as coolant.
- ► A water based nanofluid coolant with six different mass fractions were considered.
- ► The steady state mass, linear momentum and energy conservation equations are solved.
- ► utilization of nanofluid can increases the heat transfer coefficient in Super-heater zones.

Abstract

Supercritical water reactor is one of the generation IV reactors which is basically a creative mixture of conventional PWRs and supercritical pressure steam boilers. Application of nanoparticles provides an effective way of improving heat transfer characteristics of conventional coolants; thus, utilization of a nanofluid coolant in the conceptual design of this reactors is quite reasonable and