

TITLE

Thermal hydraulic performance of nanofluids as PWR primary coolant

K. Hadad

Shiraz University, Iran

This is the second in a two-part series of papers on the behavior of nanofluids as a PWR nuclear reactor coolant, where heat transfer enhancement is studied through the use of homogeneous mixture of nanoparticles with water so called 'nanofluid' as the reactor coolant. In the first paper we described the attribution of nanofluids to the neutronic properties of a PWR System-80 reactor core. This paper investigates the thermal hydraulic attribution of nanofluids as a coolant for the PWR NSSS (Nuclear Steam Supply System).

A typical fuel assembly coolant channel of the PWR System 80 is modeled using Computational Fluid Dynamic (CFD) code. The heat transfer coefficient, pressure drops and temperature profiles are calculated for three types of nanofluids including Al₂O₃, CuO and ZrO₂. Among the nanofluids studied, Al₂O₃ is shown to have suitable properties which enhances heat transfer coefficient in mass flux >4000 Kg/m²-s and volume fraction of >5%.

Biography

Kamal Hadad has completed his Ph.D from University of Arizona, Department of Aerospace Mechanical Engineering. He has published more than 100 papers in accredited journals and International Conferences.