UW Engineering Physics Colloquium Talk

FLUORIDE-SALT COOLED, HIGH-TEMPERATURE NUCLEAR REACTORS (FHR)

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21 April 2015

Fluoride-salt cooled high-temperature reactors (FHR) are cooled by liquid fluoride salt mixtures, and fuelled with solid fuel. The baseline coolant is flibe ($2LiF\text{-}BeF_2$). The fuel form is particle-encapsulated fuel (TRISO fuel particles), compacted in a graphite matrix to form fuel elements that can be spheres, plates, or other shapes, depending on the design. The baseline Mark 1 FHR design uses a nuclear air combined cycle (NACC) for power conversion, and the primary salt is used to directly heat compressed air in coiled tube air heaters (CTAHs). The goal of FHRs is to provide an energy technology with a short commercialization timeline and significant safety advantages compared to advanced light water nuclear reactors currently under construction, at costs that are competitive with natural gas power plants. This seminar will provide an overview of FHR technology development, and of the related research activity at UW on tritium transport in the salt and graphite matrix fuel, and on salt freezing and overcooling transients.

Short Biography

Raluca Scarlat is an assistant professor at UW Madison in the Department of Nuclear Engineering and Engineering Physics. She has a Ph.D. in nuclear engineering from UC Berkeley, and a B.S. in chemical engineering from Cornell University. Prior to her doctoral studies she has worked as a chemical engineer for GE and ExxonMobil. In 2011, she advised for Hitachi-GE, in Japan, on post-Fukushima changes to severe accident guidelines for the Japanese fleet of reactors. She has published articles in Nuclear Engineering and Design, Nuclear Instruments and Methods, Journal of Engineering for Gas Turbines and Power, and Progress in Nuclear Energy. Her research interests are in the area of heat and mass transport, thermal-hydraulics, nuclear reactor safety and design, and engineering ethics.