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Heat pipe application in fission driven nuclear power plant

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As the global population grow, so will the demand for energy to ensure standards of living, health and life expectancy, literacy and opportunity, etc. To cope with this energy demand, nuclear energy, which is believed to be sustainable, clean and safe, has been extensively advocated. To enhance the future role of nuclear energy systems, a generation of innovative nuclear energy systems, known as Generation IV, has been proposed to replace the current Gen II/III reactors and Gen III+ reactors that will be deployed in near future. A new concept involving the use of heat pipes as control devices for nuclear reactors will be Investigated in this book. The feature of the concept is that the heat pipe will contain a fissionable material as the working fluid. The primary purpose of the heat pipe will be to change the amount of fuel within a reactor Instead of the usual purpose of transferring heat. In conjunction with Heat Pipe (HP) in this book we have also allocated a section on Directed Reactor Auxiliary Cooling System (DRACS) and presenting the scalar analysis for it as well in particular in respect to Advanced High Temperature Reactors (AHTRs) and Small Modular Reactor (SMR) of Generation IV (GEN-IV) such as Molten Salt Reactor is shape of the Pebble-Bed Reactor (PBR). The Pebble-Bed Reactor (PBR) is a design for a graphite-moderated, gas-cooled nuclear reactor. It is a type of very-high-temperature reactor (VHTR), one of the six classes of nuclear reactors in the Generation IV initiative.

Biography

Bahman Zohuri is currently at the University of New Mexico as Associate Research Professor and Consultant at Sandia National Lab as well as Galaxy Advanced Engineering, Inc. a consulting company that he stared himself in 1991 when he left both semiconductor and defense industries after many years working as a chief scientist. After graduating from University of Illinois in field of Physics and Applied Mathematics, he joined Westinghouse Electric Corporation where he performed thermal hydraulic analysis and natural circulation for Inherent Shutdown Heat Removal System (ISHRS) in the core of a Liquid Metal Fast Breeder Reactor (LMFBR) as a secondary fully inherent shut system for secondary loop heat exchange. All these designs were, used for Nuclear Safety and Reliability Engineering for Self-Actuated Shutdown System. He designed the Mercury Heat Pipe and Electromagnetic Pumps for Large Pool Concepts of LMFBR for heat rejection purpose for this reactor around 1978 where he received a patent for it. He then was, transferred to defense division of Westinghouse later, where he was responsible for the dynamic analysis and method of launch and handling of MX missile out of canister. He has later on joined Lockheed and Rockwell International working on Satellite system for SDI as well as working and developing sensor system on board for remote sensing as well GIS. He later on was a consultant at Sandia National Laboratory after leaving United States Navy. He earned his first Bachelor's in Applied Mathematics and his second one in Physics along with his Master's degrees in Physics from the University of Illinois and his second Master degree in Mechanical Engineering as well as his Doctorate in Nuclear Engineering from University of New Mexico. He has been, awarded three patents, and has published 32 textbooks and numerous other journal publications. Recently he has been involved with Cloud Computation, Data warehousing, and Data Mining using Fuzzy and Boolean logic. He has published more than 25 papers in reputed journals and has been serving as an editorial board member of repute.

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