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Preliminary CFD study of Pebble Size and its Effect on Heat Transfer in a Pebble Bed Reactor. ANDREW JONES, CHRISTIAN ENRIQUEZ, JULIAN SPANGLER, TEIN YEE[1], JUNGKYU PARK[2], EDUARDO FARFAN[3], Kennesaw State University — In pebble bed reactors, the typical pebble diameter used is 6cm, and within each pebble is are thousands of nuclear fuel kernels. However, efficiency of the reactor does not solely depend on the number of kernels of fuel within each graphite sphere, but also depends on the type and motion of the coolant within the voids between the spheres and the reactor itself. In this work a physical analysis of the pebble bed nuclear reactor's fluid dynamics is undertaken using Computational Fluid Dynamics software. The primary goal of this work is to observe the relationship between the different pebble diameters in an idealized alignment and the thermal transport efficiency of the reactor. The model constructed of our idealized argument will consist on stacked 8 pebble columns that fixed at the inlet on the reactor. Two different pebble sizes 4 cm and 6 cm will be studied and helium will be supplied as coolant with a fixed flow rate of 96 kg/s, also a fixed pebble surface temperatures will be used. Comparison will then be made to evaluate the efficiency of coolant to transport heat due to the varying sizes of the pebbles.

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