

AN ABSTRACT OF THESIS OF

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Title: Computational Fluid Dynamics Benchmark Study of LINC Experimental Results

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Natural circulation is actively being pursued as a cooling system for most new nuclear reactor designs and spent fuel pools. To have a better and comprehensive understanding of natural circulation, an experimental facility was constructed to conduct experiments in natural circulation. The facility, designated as the Laser-Imaged Natural Circulation (LINC) facility, collected and characterized experimental results in different operating scenarios of natural circulation flow of two vertical, heated rods in water. In this study, a computational fluid dynamic (CFD) model was created in STAR CCM+ to benchmark the 200 W per rod output operating scenario from the LINC experimental tests. The CFD model results were compared to the LINC experimental results in boundary layer, velocity profile, and temperature profile. The CFD model created showed the results collected are similar in terms of profile shape but different in terms of magnitude.

Key Words: Natural Circulation, CFD, STAR CCM+