

## **BUOYANCY EFFECTS IN HELICAL PIPES DURING FLOW BOILING**

Ravi Prattipati<sup>\*,§</sup>, Sridhar V. K.<sup>\*\*</sup> and Prasad B.V.S.S.S.<sup>\*</sup>

<sup>\*</sup>IIT Madras, Chennai, TN, India

<sup>\*\*</sup>Mechanical Engineering Department, GITAM University, Hyderabad, TS, India

<sup>§</sup>Correspondence author. Fax: +91 8455 221293 Email: rprattipati@gmail.com

### **ABSTRACT**

Helically coiled heat exchangers are used in many process industries due to their compact volume and better heat transfer characteristics. Flow boiling is one of the processes used in nuclear power plants and concentrating solar power technology. Single phase and adiabatic two phase flows in helical coils is documented in literature extensively but boiling heat transfer studies are confined to experimentation only. Numerical simulations observing in detail the physics of the problem are lacking and this paper addresses this subject matter. CFD analysis of flow boiling is done using two phase Eulerian-Eulerian scheme available in ANSYS-CFX. The vapor formation and its movement in the coil are observed during changes in flow direction effectively changing the direction of the buoyancy forces. It is seen in the subsequent analysis that the buoyancy influences the accumulation of vapor formed and its diffusion into the liquid stream due to formation of recirculation zones in the liquid stream.