Performance of wire-on-tube heat exchangers used in immersion cooling for electronic packages

Abstract

In this investigation, closed loop immersion cooling of an electronic package with external condenser-a wire-on-tube heat exchanger being attached to its enclosure-is analysed. The dielectric vapour leaving the enclosure flows through the tubes of the heat exchanger. The vapour is then cooled by ambient air in free or forced convection environments. The finite element method is used in the analysis. The dielectric fluid used is FC-72. The effects of parameters like the tube length, ambient temperature, mass flow rate of the dielectric fluid, etc., on the performance of the heat exchanger have been studied. The results are also presented in the form of ε-NTU (heat transfer effectiveness-number of transfer units) curves. The proposed method may be used to check the adequacy of the number of tubes provided in the existing wire-on-tube heat exchangers for complete vapour condensation when the operating conditions are different from the design conditions.