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IMPROVING THE IMPINGEMENT COLD PLATE THERMAL DESIGN USING NUMERICAL AND ANALYTICAL APPROACH

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Abstract

Conventional cooling methods for an IC chip uses heat spreader to transfer heat from the chip end of the spreader to the opposite end of the spreader which then uses air or water to remove heat and thereby maintaining the overall temperature. Unfortunately, the heat spreader itself has constraints such as conduction resistance which adds the heat spreader inefficiency. But if we increase the area exposed to the cooling end then this can be improved. This is done by introducing channels at that end. These channels act as fins which give a better shot at cooling the system temperature. These channels are classified according to their geometry. This study basically presents improving the impingement cold plate thermal design using analytical and numerical approach. For this, a cold plate resting on a heat dissipating chip has been taken and on top of the cold plate, two heat sinks ae placed on it leaving a certain distance in between them for the incoming water flow. During experimentation, the heat from the IC chip passes through the cold plate and transfers to the heat sinks which is cooled by water. A detailed parametric analysis of the influence of heat sink geometry on inlet velocity, pressure drop and maximum temperature has been carried out. Pressure drop and temperature rise across the cold plates have been measured by running simulation on Ansys Icepak which have been then compared to the numerical results obtained. Simulations for different sizes of mesh grids in Icepak have been run to obtain optimum result.