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Design parameters for an internal natural convection heat transfer cubical apparatus are presented. These parameters provide the necessary settings so that a uniform temperature profile on a wall of this apparatus can be physically achieved. Based on the initial design of the apparatus, measurements showed that a temperature non-uniformity existed along this wall in the excess of 4% error. This error was high enough that the benchmark study could not be carried out as a temperature non-uniformity of less than 1% was desired.

The original design was modified by adding two auxiliary heaters near the wall where the uniform temperature profile was desired. Before the implementation of these heaters onto the apparatus, a detailed mathematical analysis was conducted to determine the position and the width of the heaters, and to establish the heat flux supplied by these heaters to reduce the temperature non-uniformity to less than 1%.

A generalized set of design parameters that can physically achieve the uniform temperature setting along the wall to within 1% error is presented. With these parameters, this would enable any designer with the flexibility in choosing which parameters can be used based on their need. (Received September 14, 2012)