

Abstract

This work presents an experimental study of heat transfer characteristics for open cell ceramic foam (80.13 Al₂O₃, 17.79 SiO₂, 1.57 MgO, 0.51 Na₂O. % weight) and the effect of the internal matrix of the foam construction and the size of sensors on its effective thermal conductivity, thermal diffusivity and heat capacity.

The effective thermal conductivity was measured using the Hot Disk analyzer which is working on the Transient Plane Source (TPS) method. Three kinds of pore per inch (ppi) with 10, 30 and 50 were used in this study. The specimens were cut in (160x160x50 mm) and grinded in one side to increase the contact surface and to keep the sensors safe. Sensors' types were K5501 (d=13mm), K4922 (d=30mm) and K5599 (d=60mm). There was a set of parameters (power and time) for each sensor and each kind of ppi. Also there were properties of the tests (probing depth and dimensionless time) that, according to their ranges, govern the results.

A series of experiments was performed over a wide range of the variables mentioned above, and all effects were studied.

With constant porosity for all ppi kinds, the experimental results showed that always the big difference between the highest and lowest values in K5501 sensor's tests by 34% in 10 ppi, 15% in 30 ppi and 18% in 50 ppi. And, for the K4922 sensor, the difference was 19%, 11% and 13%, respectively. And, for K5599 sensor, it was 17%, 14% and 16%, respectively. This means that the difference decreases with increase in pore per inch (ppi).