

Thermophysical Properties of a Ni-Based Superalloy

Sanghyun Lee^{C, S} and Daeho Kim

Division of Physical Metrology, KRISS, Daejeon, Daejeon, Korea

leesh@kriss.re.kr

Jung Woo Sang

High Temperature Energy Materials, KIST, Seoul, Korea

Nickel-based superalloy are gamma prime strengthened alloy with excellent mechanical and thermal properties at elevated temperatures as well as at cryogenic temperatures. The nickel-based alloys were improved to be resistant to creep and become stronger by changing the heat-treatment conditions. The applications of superalloy are in the aerospace, gas turbine, turbine blades for the jet engines, and automotive applications. The thermophysical properties of superalloy demand on thermal design. In this paper, the thermal diffusivity was measured using a laser flash method, and the specific heat capacity was measured using a differential scanning calorimeter (DSC). The thermal conductivity was calculated from the measured density, thermal diffusivity, and specific heat capacity. The thermal expansion was measured using a dilatometer. Measurement of thermophysical properties was performed within the range from room temperature, which is the temperature at which superalloys are commonly used, and 700 °C. This alloys are consist of various combinations of Ni, Fe, Co, and Cr, as well as lesser amounts of W, Mo, Ta, Nb, Ti, and Al.