Thermophysical Properties of Automobile Metallic Brake Disk Materials

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The temperature distribution, thermal deformation, and thermal stress of automobile brake disks have a very close relationship with car safety; therefore, much research in this field has been performed. However, successful and satisfactory results have not been obtained, because the temperature-dependent thermophysical properties of brake disk materials are not sufficiently known. In this study, the thermal diffusivity and the specific heat of three kinds of iron series brake disk materials, FC250, FC170, and FCD50, and two kinds of aluminum series brake disk materials, Al MMC and A356, were measured in the temperature range from room temperature to 500 ºC, and the thermal conductivity was calculated using the measured thermal diffusivity, the specific heat, and density data. The results show that the thermophysical properties of the aluminum series are 2 - 4 times larger than those of the iron series. The obtained data are applicable as basic input data in the study of the temperature distribution and the thermal analysis of brake disks.