Influence of Vector Fields on Material Thermophysical Properties

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The Thermophysical Laboratory at the Department of Thermal Engineering of Technical University of Ostrava deals with basic thermophysical property measurements of engineering materials. The properties are thermal conductivity, electrical resistivity, thermal capacity, thermal expansion, phase transformation temperature, Curie temperature, density, thermal diffusivity, electrical conductivity, and radio frequency penetration depth.
The paper deals with the influence of magnetic and electric field on thermophysical properties of some engineering materials. Thermal capacity of ferromagnetic materials was studied in dependence on magnetic flux and temperature. Thermal conductivity of foam plastic material and some engineering alloys was studied in dependence on electric field or current through the sample respectively. Free conduction electrons in electrically conductive samples are in chaotic fast movement. If voltage is across the sample, heat transfer is influenced by electrons forced to move in one direction in the applied electric field. This phenomenon is called the Thomson effect. Similar effect is expected in force of gravity, but it is not so easy to demonstrate.