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Identification of Basic Thermal Technical Characteristics of Building Materials

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Abstract: Modelling of building heat transfer needs two basic material characteristics: heat conduction factor and thermal capacity. Under some simplifications these two factors can be determined from a rather simple equipment, generating heat from one of two aluminium plates into the material sample and recording temperature on the contacts between the sample and the plates. However, the numerical evaluation of both characteristics leads to a non-trivial optimization problem. This article suggests an efficient numerical algorithm for its solution, based on the weak formulation of certain initial and boundary problem for the heat transfer equation, on the classical Fourier analysis and on the Newton iterative method, and demonstrates its practical application.

Keywords: building heat transfer; PDEs of evolution; inverse problems; Fourier method; Newton iterations; incertainties in laboratory measurements;

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