

Chapter

Variational Method for Solving the Time-Fractal Heat Conduction Problem in the Claydite-Block Construction

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Abstract

Mathematical models of the heat conduction problem in the claydite-block construction with taking into account the fractal structure of the material is constructed. Integro-differentiation apparatus of fractional order to take into account the fractal structure of the material was used. The variational formulation of the problem was constructed. The variational method for obtaining an approximate solution of the considered problem was proposed. The results of the numerical experiments of studying the thermal conductivity of claydite-block construction depending on the time, wall thickness and materials of different fractions were obtained. Analyzing the founded distributions of temperature fields allows us to more accurately reflect the real speed of the process. **Keywords**Fractal structureHeat conductionVariational formulationFinite element methodGalerkin's method

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Approximate solutions to nonlinear problems of nonstationary heat conductivity for multilayer bodies

January 1988 · Izvestiya Vysshikh Uchebnykh Zavedenij. Aviatcionnaya Tekhnika

● Kudinov Vasili Alexandrovich · V.F. Pen'kov · A. D. Rosliakov

An approximate analytical solution to the nonlinear problem of nonstationary heat conductivity is obtained for single-layer and multilayer plates for the case of the linear temperature dependence of heat conductivity. The approach used here is based on the Kantorovich variational method. The solution obtained for the nonlinear problem is compared with that for the corresponding linear problem.

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Numerical solution of the linearized Boltzmann equation for an arbitrary intermolecular potential

May 2009 · Journal of Computational Physics

● Felix Sharipov · ● Guilherme Bertoldo

A numerical procedure to solve the linearized Boltzmann equation with an arbitrary intermolecular potential by the discrete velocity method is elaborated. The equation is written in terms of the kernel, which contains the differential cross section and represents a singularity. As an example, the Lennard-Jones potential is used and the corresponding differential cross section is calculated and ... [\[Show full abstract\]](#)

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September 2010 · Chinese Physics B

● Rongjun Cheng · ● Hongxia Ge

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Recent developments in variational methods for non-equilibrium flows

November 1968 · Energy Conversion

H. W. Butler · Robert L. Rackley

Several recent developments in the field of non-equilibrium thermodynamic processes have occurred which involve the application of variational methods. Some of the earlier work by Glandsdorff and Prigogine has been extended by them and by Hays to apply to a wide range of irreversible processes. In these developments certain restrictive conditions have been assumed in order to arrive at suitable ... [\[Show full abstract\]](#)

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June 1978

A. P. Slesarenko

The joint application of the method of small parameter, the Laplace transformation, the method of R functions and variational methods to the solution of nonlinear problems of unsteady heat conduction is examined. Numerical results for one problem are presented and these are compared with experimental data.

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Heat conduction with a temperature-dependent thermal conductivity coefficient

December 1970 · Journal of Engineering Physics

Enrico Lorencini

A variational method is employed to solve stationary and nonstationary heat conduction problems when the thermal conductivity coefficient is temperature-dependent and the heat generation function of the medium is arbitrary.

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Simulation of Permafrost Thaw Behavior at Prudhoe Bay

March 1978 · Journal of Petroleum Technology

C. J. Lin · J. D. Wheeler

This paper presents mathematical models to simulate transient heat flow within the wellbore and in the permafrost during drilling, production, antifreeze-back. Calculated temperatures agree well with measurements taken in the wellbore and in the permafrost during field tests at Prudhoe Bay. Production-thaw predictions are presented for a typical Prudhoe Bay well with three different insulation ... [\[Show full abstract\]](#)

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November 1987 · Journal of Petroleum Technology

Maurice A. Biot · L. Masse · W. L. Medlin

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Use of a variational method to solve a heat conduction problem with internal heat sources

May 1966 · Journal of Engineering Physics

A. M. Fain

An examination is made of Kantorovich's variational method for analytical solution of steady heat conduction problems with internal heat sources having a two-dimensional distribution law. A method is described for choosing coordinate functions which satisfy the assigned boundary condition. Dimensionless coefficients of the system of Euler equations are introduced.

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December 2005

J.E. Akin

This chapter presents the details of formulating the solution to the steady-state heat conduction problem. The approach is general, however, and by redefining the physical quantities involved the formulation is equally applicable to other problems involving the Poisson equation. The physical behavior governing a variety of problems in engineering can be described as scalar field problems. That ... [\[Show full abstract\]](#)

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