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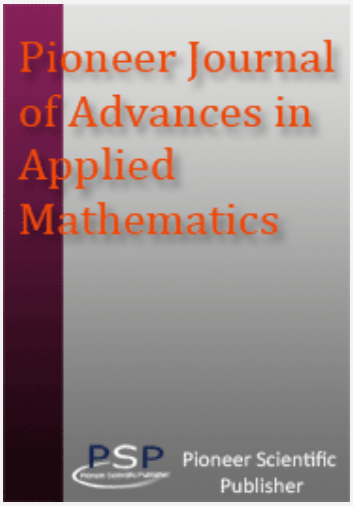

SOLVING LUIKOV EQUATIONS OF HEAT AND MASS TRANSFER WITH RADIAL BASIS FUNCTIONS AND IMPLICIT (CRANK-NICOLSON) SCHEME

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Abstract

This article presents the applicability of RBFs and Implicit (Crank Nicolson) time scheme for solution of the systems of the partial differential equations derived by Luikov with corresponding initial and boundary conditions. The Luikov system of equations for moisture potential and temperature can be solved by analytical or numerical methods. In recent years, the radial basis function methods have emerged as alternative computing methods in scientific computing community. The numerical solution of partial differential equations have usually been obtained by finite difference methods, finite element methods, boundary elements methods or finite volume methods. In our case, we have used the concept of solving partial differential equations with the radial basis functions method and Implicit (Crank Nicolson) scheme. More cases are presented. First, by the transient distributions of temperature and moisture in a slab of wood during drying are presented. The results closely correspond to published analytical solutions. Then a two-dimensional analysis of timber beam exposed to fire from three sides are presented. The results of wood under increasing heat fluxes calculated by the RBF methods are also compared with experimental results.

Keywords and phrases: Luikov's equations, radial basis functions (RBFs), multiquadric RBF methods, wood drying, charring of wood, greedy algorithm.