D1: A NOTE ON A FREE BOUNDARY VALUE PROBLEM RELATED TO AUTO IGNITION OF COMBUSTIBLE FLUID IN INSULATION MATERIALS

[1]Olayiwola, R. O.,Cole, A. T., Shehu, M. D., Oguntolu, F. A., Fadepo J. T., Okoosi F. E.
Department of Mathematics, Federal University of Technology, Minna, Nigeria.
olayiwola.rasaq@futminna.edu.ng

Abstract

Auto ignition of combustible fluids in insulation materials is one of the major problems facing the processing industries and many developing nations because it leads to serious environmental problem. This paper presents an analytical solution to a free boundary value problem related to auto ignition of combustible fluids in insulation materials. The aim is to ascertain whether such a system is safe or if it will undergo ignition for a particular set of conditions. The conditions for the existence of unique solution of the model is established by actual solution method. The properties of solution is examined. The analytical solution is obtained via polynomial approximation method. which show the influence of the parameters involved on the system. The effect of changes in parameters such as the Frank-Kamenetskii number and the endothermicity are presented graphically and discussed.

Keywords and Phrases: Auto ignition, combustible fluids, free boundary value problem, polynomial approximation method

[2010] Mathematics Subject Classification: 80A25, 76S05