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## Numerical investigation of thermal stability in media of different physical geometries

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Spontaneous combustion in stockpiles of combustible materials is due to exothermic chemical reaction taking place within the system, where the trapped oxygen reacts automatically with the material containing hydrocarbons. The chemical reaction results with heat as one of the products. Should the rate of heat production exceed that of heat release to the ambient, the system's temperature increases rapidly and may lead to thermal runaway that ultimately causes self-ignition. In this study, effects of kinetic parameters such as activation energy and rate of reaction on the temperature of the system are investigated. These parameters are embedded on the differential equation governing the problem. The combustion reaction results with complicated reaction mechanism that is nonlinear and as a result the nonlinear differential equation is tackled using numerical methods. Runge-Kutta-Fehlberg method coupled with shooting technique is used to solve the equation with the help of Maple software.

### Biography

Ramoshweu Solomon Lebelo is a Researcher and Senior Lecturer in the Department of Mathematics at Vaal University of Technology, South Africa. He obtained Doctoral degree in Mechanical Engineering from Cape Peninsula University of Technology, South Africa. The areas of research are in the fields of fluid dynamics, computational mathematics and heat transfer systems. His publications are in international journals and peer-reviewed conference proceedings.

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