Thermo-mechanical analysis in a simply supported plate using fractional order approach

Navneet Lamba[1*], Jyoti Verma[2], and Kishor Deshmukh[3]
[1]Department of Mathematics, S.L.P.M. Mandhal, R.T.M., Nagpur University, Nagpur India
[2]Department of Mathematics, SVKMs NMIMS, School of Science, Navi Mumbai, India
[3]Ex Prof., Department of Mathematics, R.T.M., Nagpur University, Nagpur India
[1*]Email: navneetkumarlamba@gmail.com,
[2]Email:jyotiverma.maths@gmail.com, [3]Email: kcdeshmukh2000@rediffmail.com

Abstract
A simply supported rectangular plate of small thickness with a thermal bending moment is taken into account in this proposed work, and fractional order theory is used to analyse the thermoelastic effects. A point heat source that is instantly available and situated anywhere inside the solid rectangular plate is also present. The influences of thermally stressed components are evaluated for weak, moderate, and super conductivity using the thermal moment of bending. Limit cases for the classical heat conduction equations are also investigated. The outcomes are achieved as a series solution, and the corresponding convergences have been illustrated.

Key words: rectangular plate, thermal bending moment, heat source, fractional order theory, thermal stress.