National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Study of some non-Newtonian flow and heat transfer problems
Speaker	: Rajkumar Saha Chowdhury (Rollno : 522ma1007)
Supervisor	: Bikash Sahoo
Venue	: Seminar room, Department of Mathematics
Date and Time	: 21 Mar 2025 (5:00PM)
Abstract	: We investigate the steady, unsteady non-Newtonian laminar flow and heat transfer problems subject to various physical effects. The governing equations give rise to fully coupled and highly nonlinear partial differential equations (PDEs). Even after proper boundary layer approximations, finding analytical and numerical solutions of these nonlinear system of PDEs remain challenging. Using Lie group analysis, we derive appropriate similarity variables, transforming the nonlinear PDEs into a system of nonlinear ordinary differential equations (ODEs), which are then solved numerically. We perform asymptotic analysis of the similarity equations to gain further insights. Interestingly, most of the problems under consideration possess multiple solutions. Temporal stability analysis has been used to find the physically feasible solutions.