(MT-601) Advanced Non-Newtonian Fluid Mechanics

Real fluids and ideal fluids, vectors, tensor, differential operators, gradient of vector valued function, velocity and acceleration, kinematics, relative deformation function and gradient, local and convective derivative, first problem of stokes, Rayleigh-Stokes problem, physical components, kinematics of the helical flows, basic laws, dynamical system, body and contact forces, navier-stokes equations, incompressibility condition, rotational and irrotational flow, velocity potential, harmonic fuction, cauchy-rieman equations, types of flows, Newtonian fluid, constitutive equation, equation of motion for fluid, Euler's equation of motion, compressible flows, laminar flow over and inclined plan, laminar flow between fixed parallel plates, laminar film over a vertical wall, laminar flow in an annulus, circular coutte flow, unsteady flows, first problem of stokes, diffusion of a vortex sheet, steady-state and transient solution, non-Newtonian fluids, stokes second problem for second grade fluid, unsteady motion over plane wall of second grade fluid, Rayleigh-Stokes problem for second grade fluid, different types of boundary conditions for velocity and shear stress, , first problem of stokes for oldroyed-b fluid, flows between two parallel plate, flows between cylindrical domain and fractionalized flows.

Reference Books:
1. Fluid Dynamics: An Introduction, Michel Rieutord, Springer, 2015.

2. Advances in Fluid Mechanics, C. A. Brebbia, S. Hernández, M. Rahman, WIT Press, 2014.

3. Fluid dynamics , M. D. Raisinghania, S. Chand & Company, 2014.

4. Batchelor, G.K. , An Introduction to Fluid Dynamics, Cambidge University Press,Latest available.

5. L.D. Landau and E.M. Lifshitz., Fluid Mechanics, Pergamon Press, Latest available.