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Heat Transfer and Couette Flow of a Chemically-Reacting Non-Linear Fluid[1] KEREM UGUZ, Bogazici University, Department of Chemical Engineering, Istanbul, Turkey, MEHRDAD MASSOUDI, U.S. Department of Energy, National Energy Technology Laboratory (NETL), Pittsburgh, PA, 15236, USA —
The velocity, temperature, and concentration fields of a reacting fluid flowing in a channel are obtained. The fluid is assumed to flow between two parallel plates where one of the plates is sheared at constant speed whereas the other one is stationary. The plates are kept at constant hot and cold temperatures. Chemically reacting fluids are used in many industries and technologies such as combustion, catalysis, and biological systems and they usually show non-Newtonian behavior. The fluid is assumed to obey generalized power-law constitutive equation and its physical properties, i.e., viscosity, thermal conductivity and the diffusion coefficients are assumed to be a function of the concentration. The system is studied numerically for various parameters.

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