

## **Unsteady flow due to a contracting cylinder in a nanofluid using Buongiorno's model**

### **Abstract**

The unsteady flow and heat transfer of a nanofluid over a contracting cylinder is studied. Using a similarity transformation, the unsteady Navier–Stokes equations are transformed into a system of ordinary differential equations, which are then solved numerically using a shooting method. The effects of the unsteadiness parameter and the Brownian motion parameter on the flow field and heat transfer characteristics are analyzed and graphically presented. Dual solutions are found to exist for a certain range of the unsteadiness parameter. It is observed that the skin friction coefficient, the Nusselt number and the Sherwood number decrease with increasing values of the unsteadiness parameter. The magnitude of the Nusselt number and the Sherwood number decrease as the Brownian motion parameter increases.

**Keywords:** Unsteady flow, Nanofluids, Dual solutions, Contracting cylinder