

Department of Mathematical & Statistical Sciences

COLLOQUIUM

“Flow down a vertical fibre”

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Thursday, October 11th 2007
3:30 p.m. in CAB 243

The vertical flow of a fluid, under the influence of gravity, down the exterior of a rigid fibre is a flow accompanied by rich dynamics that manifests itself via the formation of droplets, or beads, driven by a Rayleigh mechanism modulated by the presence of gravity. These droplets propagate down the fibre and undergo coalescence with preceding droplets. Different flow regimes are possible depending on system parameters such as the fibre radius, liquid flow rate and physical properties. We derive an evolution equation for the interface in the long-wavelength approximation, which captures the flow characteristics of the system; this model is similar to those previously used to investigate the dynamics of slender viscous threads in the absence of the fibre. Analytical and numerical solutions of the evolution equation yield information regarding the shape and propagation speeds of the droplets, which is in good agreement with available experimental data as well as those obtained as part of the present work. Connections with models already available in the literature are also established.

***For those attending the Colloquium,
a reception will be held at 4:30 pm in CAB 649.***