Talk Titles and Abstracts – Wednesday 11 January

14.30-14.50: **Yasemin Sengul Tezel** (Cardiff University)

Talk Title: Mathematical analysis of nonlinear material response: viscoelasticity

Abstract: In this talk I will briefly describe my main research interests, namely, nonlinear viscoelasticity from the viewpoints of classical and implicit constitutive theories. I will try to point out my main contributions and discuss some open problems.

14.50-15.10: **Hannah-May D'Ambrosio** (University of Strathclyde)

Talk Title: The effect of contact line motion on the deposition of particles from an evaporating droplet

Abstract: The evaporation of sessile droplets occurs in numerous physical contexts, with applications in nature, industry, and biology, including coating, chemical decontamination, and inkjet printing. As a consequence of the wide variety of everyday applications, the evolution of, and the deposition from, an evaporating droplet has been the subject of extensive investigation in recent years, with particular interest in droplet lifetimes and in the ring-like deposit (the "coffee-ring") that often forms at the contact line of a pinned evaporating droplet. Previous work has shown that the mode in which a droplet evaporates is a key factor in determining the lifetime of a droplet undergoing diffusion-limited evaporation. However, few studies have investigated the effect of the mode of evaporation on the deposition of particles from an evaporating droplet, and those that do often use a spatially-uniform evaporative flux to approximate the diffusion-limited model for evaporation. In this talk we investigate the effect of contact line motion and the local evaporative flux on the deposition of particles from an evaporating droplet. For a thin axisymmetric droplet, we determine the resulting flow due to the evaporation, the evolution of the concentration of particles within the droplet, and the evolution of the mass of deposit on the substrate for a droplet undergoing diffusion-limited and spatially-uniform evaporation in four different modes of evaporation. We find qualitatively different deposit types depending upon the mode in which the droplet is evaporating, as well as on the local evaporative flux. In particular, we show that spatially-uniform evaporation is not an accurate approximation to the diffusion-limited model for the flow within, and deposition from, an evaporating droplet when the contact line is receding.

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15.10-15.30: **Alexandra Tzella** (University of Birmingham)

Talk Title: Diffusion in arrays of obstacles: beyond homogenisation

Abstract: We examine the diffusion of a chemical or heat released in a homogeneous medium interrupted by an infinite number of impermeable obstacles arranged in a periodic lattice. We extend classical results due to Maxwell, Rayleigh and Keller by applying ideas of large-deviation theory to describe the concentration or temperature distribution at large distances from the point of release. We use matched asymptotics to obtain explicit results in the case of nearly touching obstacles, when the transport is strongly inhibited. The technique developed can be applied to complex systems including porous media and composite materials. This is based on joint work with Y. Farah, D. Loghin and J. Vanneste.