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**Sedimentation of particles: how can such a simple problem be so difficult?** ELISABETH GUAZZELLI, IUSTI CNRS Polytech'Marseille — Although the sedimentation of particles at low Reynolds number can be considered as one of the simplest examples of suspension flow, much remains unknown about the fundamental properties of sedimenting suspensions such as the mean sedimenting velocity, the dispersion (or mixing) of particles due to velocity fluctuations, the behavior of finite clusters of particles, and instabilities. The difficulty in all these problems lies in the long range nature of the multibody hydrodynamic interactions between particles, the nature of screening in suspensions of finite concentration, and the coupling between these and the microstructure of the suspension, i.e. the orientations and relative positions of the particles. The first part of the talk will review some results on the mean velocity and velocity fluctuations for sedimenting suspensions of monodisperse non-Brownian spheres. The second part will examine the sedimentation of non-spherical particles such as fibers which, unlike a suspension of spheres, is unstable to perturbations in concentration. Finally, the third part will be devoted to the sedimentation of drops of particles which surprisingly do not maintain spherical shape. Our work on these various problems has been done in collaborations with L. Bergougnoux, J. E. Butler, D. Chehata, M. L. Ekiel-Jezewska, B. Herzhaft, E. J. Hinch, M. Mackaplow, B. Metzger, H. Nicolai, Y. Peysson, D. Saintillan, E. S. G. Shaqfeh.

Prefer Oral Session  
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Elisabeth Guazzelli  
elisabeth.guazzelli@polytech.univ-mrs.fr  
IUSTI CNRS Polytech'Marseille

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