

Advanced Computational Approaches of Composites Forming Processes

Francisco Chinesta

ESI GROUP Chair Professor, Ecole Centrale de Nantes, France

Francisco.Chinesta@ec-nantes.fr

Most suspension descriptions nowadays employed are based on the Jeffery's model and some phenomenological adaptations of it that do not take into account the possible existence of a relative velocity between the fibers and the suspending fluid when moving from the dilute to the highly concentrated flow regimes. It is expected that at very low concentrations, as predicted by standard suspension models, the movement of fiber and the fluid remains indiscernible, that is, both are moving with the same velocity. When the concentration is extremely high and a percolated network of fiber contacts is established all along the suspension, fiber cannot move anymore and then the fluid flows throughout the rigid or moderately deformable entangled fibers skeleton, like a fluid flowing through a porous medium. In between these two limit cases, one could expect that fibers move but with a velocity lower than the one of the suspending fluid, and like this two contributions are expected, one coming from standard suspension theory in which fibers and fluid move with the same velocity, the one of the fibers, and the other resulting in a Darcy's contribution consisting of the relative fibers/fluid velocity through the fibers skeleton now assumed at rest. In this talk we elaborate a general model able to adapt continuously to all these scenarios.