Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Oil filaments produced by an impeller in a water stirred tank RENE SANJUAN-GALINDO, ENRIQUE SOTO, GABRIEL ASCANIO, ROBERTO ZENIT, Universidad Nacional Autonoma de Mexico — Oil dispersions in aqueous media produced in stirred tanks are part of many industrial processes. The oil drops size and dispersion stability are determined by the impeller geometry, stirring velocity and the physicochemical properties of the mixture. A critical parameter is the total interfacial area which is increased as the drop size is decreased. The mechanism that disperses the oil and generates the drops has not been completely explained. In the present work, castor oil (1% v/v, viscosity 500mPa) and water are stirred with a Scaba impeller in a flat bottom cylindrical tank. The process was recorded with high-speed video and the Reynolds number was fixed to 24,000. Before the stirring, the oil is added at the air water interface. At the beginning of the stirring, the oil is suctioned at the impeller shaft and incorporated into the flow ejected by the impeller. In this region, the flow is turbulent and exhibits velocity gradients that elongate the oil phase. Viscous thin filaments are generated and expelled from the impeller. Thereafter, the filaments are elongated and break to form drops. This process is repeated in all the oil phase and drops are incorporated into the dispersion. Two main zones can be identified in the tank: the impeller discharge characterized by high turbulence and the rest of the flow where low velocity gradients appear. In this region surface forces dominate the inertial ones, and drops became spheroidal.

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Date submitted: 09 Aug 2010 Electronic form version 1.4