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Yuri Zeniti Sinzato, Nuno Jorge Sousa Dias, Francisco Ricardo Cunha

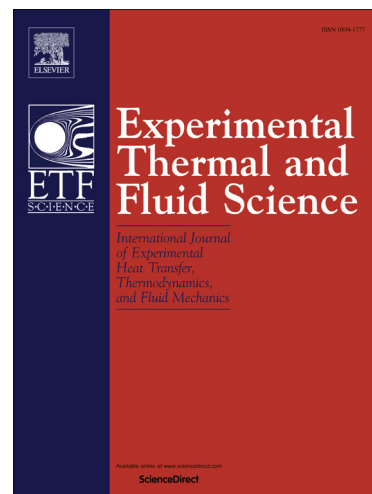
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An experimental investigation of the interfacial tension between liquid-liquid mixtures in the presence of surfactants

Yuri Zeniti Sinzato, Nuno Jorge Sousa Dias, Francisco Ricardo Cunha

*University of Brasilia, Department of Mechanical Engineering, Laboratory
Microhydrodynamic and Rheology - VORTEX, Brasilia-DF, 70910 900, Brazil*

Abstract

The property interfacial tension between liquid-liquid interfaces is a crucial quantity on the study and characterization of emulsion flow rheology. The use of surfactant molecules on a membrane avoids for instance coalescence of the oil droplets by reducing the interfacial tension of the mixture. A transient effect occurs due to the redistribution of the surfactant molecules at the liquid-liquid interface. The present work carries out interfacial tension measurement as a function of the continuous phase components volume fraction which is equivalent to a liquid-liquid interface of different viscosity ratios. The dependence of the interfacial tension on the volume fraction of surfactants is also examined. The experiments are carried out in a drop volume tensiometer, based on the balance between buoyancy and capillary forces on a drop that is detached from the edge of a capillary tube. The interfacial tension between mineral oil drop and a glycerol/water solution is then measured for several values of glycerol volume fractions. The interfacial tension between an oil drop and water is also measured for various concentrations of the Span 80 (i.e. lipophilic surfactant) and Tween 80 (i.e. hydrophilic surfactant). Correlation functions are proposed in order to fit the experimental data. The equilibrium time of the surfactant distribution by the mechanisms of adsorption and by the Marangoni stresses resulting from the flow-induced surface tension gradients on the drop surface and the corresponding equilibrium interfacial tension are used as parameters of the correlations. The results show that the relaxation time for the surfactant distribution reach-

Email address: frcunha@unb.br (Francisco Ricardo Cunha)

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