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Coalescence dynamics of a Non-Newtonian drop in a Hele-Shaw cell[1] PANAGIOTA ANGELI, VICTOR VOULGAROPOULOS, MAXIME CHINAUD, Department of Chemical Engineering, University College London, Torrington Place, London WC1E 7JE, UK — In this study, the quasi-2D coalescence of an aqueous droplet with a flat interface is studied. The two immiscible liquids used in the coalescence experiments are a water/glycerol mixture and low viscosity oil. Experiments are conducted in a Hele-Shaw cell with an aspect ratio of 14 by 8 by 0.125 cm while time resolved velocity fields are obtained by using high-speed bright field Particle Image Velocimetry measurements. The aim of the present study is to investigate the effect of a polymer (i.e. xanthan gum), which results in a shear-thinning behaviour of the aqueous phase. It was found that the time evolution of the neck at the initial stages of coalescence follows a linear trend, which suggests that the shear-thinning behaviour at the neck region at this stage of coalescence can be considered quasi-constant in time. In addition, velocity and vorticity fields are computed inside the coalescing droplet and the bulk homophase. It is found that two pair of counter rotating vortices are generated just after the rupture of the film which separates the drop from the homophase. Furthermore, the polymer addition reduced the magnitude of the corresponding vorticity peaks in the drop and slowed down the coalescence dynamics.

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