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Submicron flows of polymer solutions AMANDINE CUENCA, HUGUES BODIGUEL, LOF UMR5258, University of Bordeaux 1, CNRS, Rhodia 178, avenue du Docteur Schweitzer, 33608 Pessac - France — We study flow properties of high molecular weight polymer solutions below the micrometer scale. Fluorescence photobleaching is used as a non-invasive technique to evaluate the velocity of pressure-driven flows in channels from 200 to 4000 nm height. We observe a striking reduction of the effective viscosity. The latter is reduced up to 50 times at 400 nm. This effect increases with molecular weight and concentration. Using a Rabinowitsch-like approach, we correlate the data at different thicknesses to obtain both the slippage at the wall and the rheological flow curve at sub-microscale. Those properties are also evaluated in bulk using respectively PIV (Particle Image Velocimetry) and rheometer. Comparing the measurements in bulk and in confined geometries, we conclude that the viscosity reduction can not solely be explained by slippage. We can think of two origins of the confinement effect, either it modifies the polymer solution on itself, in terms of concentration (size- dependent filtration of coils) or it induces a change in the rheological behaviour.

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