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Simultaneous measurement of velocity and concentration fields in Hele-Shaw cell MOBIN ALIPOUR, TU Wien , University of Udine, DR. MARCO DE PAOLI, TU Wien, ALFREDO SOLDATI, TU Wien , University of Udine — Convective dissolution in porous media has a wide range of applications such as sea ice formations, evaporation from soil and geological carbon dioxide storage. While the wealth of computational studies has shed a light on some fundamental features of this flow, experimental techniques currently adopted do not allow an easy, simultaneous and accurate measurement of concentration and velocity fields and we aim precisely at this gap. In this work, we performed experiments in Hele-Shaw geometry and used an optical technique to obtain the solute concentration field. We propose a concentration-based velocity reconstruction (CVR) algorithm, i.e. a new method to reconstruct the velocity field from the solute concentration measurements. In particular, measurements of the concentration gradients are used to reconstruct the velocity field from the momentum transport equation. Effect of gap thickness and non-Darcian behavior of the flow are analyzed by means of both concentration and velocity observations of the fingers. We compare the CVR results with the velocity fields obtained via particle tracking velocimetry (PTV) measurements, giving the guidelines for future experimental works.

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