

ON THE ANALYTICITY OF THE MUSKAT EQUATION AND THE UNIFORMLY ROTATING SOLUTIONS OF THE 2D EULER/G-SQG EQUATIONS

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We will talk about two problems. The first one is about the regularity of the solutions to the Muskat equation. The Muskat equation describes the interface of two liquids in a porous medium. We will show that if a solution to the Muskat problem is sufficiently smooth, then it must be analytic except at the points where a turnover of the fluids happens. We will also show analyticity in a region that degenerates at the turnover points provided some additional conditions are satisfied.

The other problem studies the radial symmetry properties of stationary and uniformly rotating solutions of the 2D Euler/g-SQG equations. We will show some rigidity results giving conditions under which the solutions must be radial. We will also show some flexibility results: the existence of non-radial solutions. The results on this second problem are joint work with Javier Gomez-Serrano, Jaemin Park and Yao Yao.