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Rafael Granero-Belinchon* (rgranero@math.ucdavis.edu), Department of Mathematics,
University of California, Davis, One Shields Avenue, Davis, CA 95616. *Global existence and finite
time blow-up for the Muskat problem.*

The Muskat problem studies the dynamics of a free boundary of a fluid through porous media. Such free boundary problems for incompressible fluids have been intensively studied in the recent years. A particularly interesting topic is the global existence vs. finite time blow-up of the solution. Most of the known results use the contour equation for the interface. This approach requires tools from harmonic analysis and singular integral operators.

In this talk we will review some of the existing results concerning the 2D case (i.e. the interface is one-dimensional). Finally, we will present a new approach (an Arbitrary Lagrangian Eulerian method) to analyze this problem. We will also present our results obtained by using the ALE method. (Received September 01, 2014)