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A Numerical Simulation of the Density Oscilator[1] SERGIO HERNANDEZ ZAPATA, ERICK JAVIER LOPEZ SANCHEZ, GERARDO RUIZ CHAVARRIA, Facultad de Ciencias, UNAM — In this work we carry out a numerical simulation for the dynamics that originates when a fluid (salty water) is located on top of another less dense fluid (pure water) in the presence of gravity. This is an unstable situation that leads to the development of intercalating lines of descending salty water and ascending pure water. Another situation is studied where the fluids are in two containers joined by a small hole. In this case a time pattern of alternating flows develops leading to an oscillator. The study of the velocity field around the hole shows than in a certain interval of time it develops intercalating lines like in the former situation. An interesting result is the fact that when a given fluid is flowing in one direction a vorticity pattern develops in the other fluid. The Navier-Stokes, continuity and salt diffusion equations, are solved numerically in cylindrical coordinates, using a finite difference scheme in the axial and radial directions and a Fourier spectral method for the angular coordinate. On the other hand, the second order Adams-Bashfort method is used for the time evolution. The results are compared to a numerical simulation of a pedestrian oscillator we developed based on the Hebling and Molnar social force model.

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