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Numerical simulation of a two-dimensional internal wave attractor

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Internal (gravity) wave attractors may form in closed containers with boundaries non parallel or non normal to the gravity vector. Such attractors have been studied from a theoretical point of view, in laboratory experiments and using linear numerical simulations. We present two-dimensional numerical simulations of an internal wave attractor, based upon the nonlinear and non hydrostatic MIT-gcm numerical code. We reproduce the laboratory experiment of a wave attractor performed by Hazewinkel *et al.* (*J. Fluid Mech.*, in press) and obtain a very good agreement with the experimental data. We next propose simple ideas to model the thickness of the attractor. The model predicts that the thickness should scale as the $1/3$ power of the non dimensional parameter measuring the ratio of viscous to buoyancy effects. When the attractor is strongly focusing, the thickness should also scale as the $1/3$ power of the spatial coordinate along the attractor. Computation of the exponent for two different attractors shows that, despite the simplicity of our model, a value differing from $1/3$ by less than 30% is obtained. We eventually study nonlinear effects induced by the attractor.