

Abstract Submitted
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Fluid exchange flows HERBERT HUPPERT, ITG, DAMTP, University of Cambridge — Flow flows from one container to another play important roles in many natural and industrial situations. The talk will describe the latest work on some of these. 1. The exchange flow of relatively dense, viscous fluid in a container connected by a vertical pipe to a container beneath it, initially full of relatively light fluid, will be discussed. This mimics the important exchange flow between a volcanic crater and a deep magma reservoir. A quantitative analysis of the flow will be presented. For the volcanic situation this allows the conduit radius to be evaluated from observations of the sulphur dioxide flux from the crater to the atmosphere. 2. A closed container initially full of liquid, which can drain into the atmosphere through a very long tube, displays different phenomena, which are associated with the compressibility of the air that exchanges space with the liquid. Three distinct regimes are observed, which we term: ‘popping’; ‘glugging’; and ‘slugging’. During each of these the container drains at a quite different rate. 3. Hot air in a house can be exchanged through doors and windows with the cooler air outside. The form and rate of exchange and its dependence on window geometry is of considerable architectural interest at the moment, if only to make our working environment as green as possible. New experiments and the associated concepts for this problem will be discussed.

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