

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Diffusive liquid transport in poroelastic materials : the case of foams in microgravity ARNAUD SAINT-JALMES, SEBASTIEN MARZE, HERNAN RITACCO, DOMINIQUE LANGEVIN, Laboratoire de Physique des Solides, Universite Paris-Sud, Orsay — On Earth, the liquid inside an aqueous foam irreversibly flows due to coupled gravitational and capillary effects. In microgravity, one can study liquid transport with only capillarity as a driving force. Here, we report results of capillary imbibition experiments performed in parabolic flights in which we follow how and where some liquid locally injected into a foam spreads with time. Different setup geometries, imbibition modes and bubble surface mobilities are studied. New behaviors, not observed on ground, with high liquid fractions are found. Comparisons with theoretical models are presented, allowing us to find their limits of validity as the liquid fraction is increased. These experiments also give us some insights on the convective instability occurring on ground, and allow us to discuss the analogy with diffusive liquid transport and swelling in other poroelastic materials, like plants and tissues.

Arnaud Saint-Jalmes
Laboratoire de Physique des Solides, Universite Paris-Sud, Orsay

Date submitted: 01 Dec 2005

Electronic form version 1.4