

综述评论

## 液态泡沫渗流的机理研究进展

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**摘要** 液态泡沫是具有高度自组织结构的非平衡系统. 泡沫中的微量液体在重力与毛细管力作用下, 在由薄膜、柏拉图通道以及交汇点形成的通道网络内的流动称为泡沫渗流(foam drainage), 它直接影响泡沫结构的稳定性. 本文从泡沫物理学角度对液态泡沫的结构首先做了简单介绍, 并对泡沫材料与多孔介质之间的区别和联系做了简单介绍. 文章分析了由泡沫渗流、气泡粗化和液膜破裂而引起的泡沫结构演化规律, 着重介绍了目前泡沫渗流研究中对柏拉图通道边界条件的处理方法、相应的渗流模型及其在一维泡沫渗流中的应用, 并对泡沫渗流实验检测手段及微重力条件下的泡沫渗流实验和理论研究做了综述.

**关键词** [液态泡沫](#), [渗流](#), [稳定性](#), [微重力](#), [复杂系统](#)

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### Abstract

Liquid foam is a typical non-equilibrium complex system with hierarchy and self-organization structure. The process by which liquid from both films and Plateau borders drains out of a freshly made foam as a result of the gravitational force and the capillary force is called foam drainage, which plays a vital role in foam stability. From the view of foam physics, this paper firstly gives a brief introduction to the regular foam structure, and then explains three main mechanisms for foams to evolve into equilibrium state, drainage, gas diffusion and film rupture. The differences and similarities between foam-like materials and porous media are discussed. Recent progress in studies on foam drainage is reviewed, including of the treatment of boundary condition of Plateau border and the corresponding flow regimes, drainage models and applications in one dimensional foams, and the results in 2D foam drainage. We also discuss techniques used in foams drainage experiments and the recent important progress in the experimental and theoretical studies on foam drainage in space.

**Key words** [liquid foams](#) [drainage](#) [stability](#) [micro-gravity](#) [complex system](#)

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