

Mathematical modelling of filter coffee brewing

William Lee, MACSI, University of Limerick

Abstract:

Coffee is a key component of many people's day, and yet the recipe for a perfect cup of coffee remains elusive. Part of the reason for this is that although the chemistry of coffee has been thoroughly studied, the physics of brewing coffee has received much less attention. I will discuss recent advances in the mathematical modelling of coffee brewing that have resulted from collaboration between experimentalists at Philips and mathematical modellers based in MACSI. By exploiting an analogy between brewing filter coffee and groundwater chemistry and flow I will show how a set of partial differential equations describing coffee extraction and transport can be derived. I will then discuss strategies for the asymptotic reduction of these equations and compare asymptotic results with simulations based on the full equations and with experimental results.