LadHyX Seminar – June 14, 10:45

Herbert Huppert
(DAMTP, Cambridge)

How long does it take to get there?

There are a huge number of nonlinear partial differential equations that do not have analytic solutions. Often one can find similarity solutions, which reduce the number of independent variables, but still leads, generally, to a nonlinear equation. This can, only sometimes, be solved analytically. But always the solution is independent of the initial conditions. What role do they play? It is generally stated that the similarity solution agrees with the (not determined) exact solution when (for some variable say t) obeys $t \ll t_1$. But what is t_1? How does it depend on the initial conditions? How large must t be for the similarity solution to be within 15, 10, 5, 1, 0.1, .. percent of the real solution? And how does this depend on the parameters and initial conditions of the problem? I will explain how two such typical, but somewhat different, fundamental problems can be solved, both analytically and numerically, and compare some of the results with small scale laboratory experiments, performed during the talk. It will be suggested that many members of the audience could take away the ideas and apply them in their own special areas.