Seminário de Análise

Some limits of the Stokes and Navier-Stokes equations in a punctured periodic domain

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Abstract. In this talk, we consider three problems on a two-dimensional 'punctured periodic domain': we take $\Omega_r = (-L, L)^2 \setminus rK$, where $r > 0$ and K is the closure of an open connected set that is star-shaped with respect to 0 and has a C^1 boundary. We impose periodic boundary conditions on the boundary of $\Omega = (-L, L)^2$, and Dirichlet boundary conditions on $\partial(rK)$. In this setting we consider the Poisson equation, the Stokes equations, and the time-dependent Navier–Stokes equations, all with a fixed forcing function f, and examine the behaviour of solutions as $r \to 0$. In all three cases we show convergence of the solutions to those of the limiting problem, i.e. the problem posed on all of Ω with periodic boundary conditions.