Lower bound on the blow-up rate of the axisymmetric Navier-Stokes equations

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Abstract

Consider axisymmetric strong solutions of the incompressible Navier-Stokes equations in R^3 with non-trivial swirl. Such solutions are not known to be globally defined, but it is shown that they could only blow up on the axis of symmetry. Let z denote the axis of symmetry and r measure the distance to the z-axis. Suppose the solution satisfies the pointwise scale invariant bound $|v(x,t)| \le C_*(r^2-t)^{-1/2}$ for $-T_0 \le t < 0$ and $0 < C_* < \infty$ allowed to be large, we then prove that v is regular at time zero. This is a joint work with C.-C. Chen, R. M. Strain and H.-T. Yau. See http://arxiv.org/abs/math.AP/0701796 for preprint.