Stability of local existence and numerical verification of regularity in 3D Navier-Stokes equations

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We consider the Navier-Stokes equations on the 3D torus. We recall some results concerning stability of local existence under perturbations of initial data in $H^{1/2}$. Then we use the robustness of regularity in $H^{1/2}$ and the idea from [1] to present an explicit algorithm that can be used to verify numerically the following statement: *all initial conditions in a given bounded set X in H^1 give rise to strong solutions of the forceless Navier-Stokes equations.* This is a joint work with James C. Robinson and Pedro Marin Rubio ([2]).

References

[1] *S. I. Chernyshenko, P. Constantin, J. C. Robinson, E. S. Titi*: A posteriori regularity of the three-dimensional Navier-Stokes equations from numerical computations. J. Math. Phys. *48* (2006), 1–15.

[2] *J. C. Robinson, P. Marin-Rubio, W. Sadowski*: Solutions of the 3D Navier-Stokes equations for initial data in $\dot{H}^{1/2}$: Robustness of regularity and numerical verification of regularity for bounded sets of initial data in $\dot{H}^1$. JMAA *400* (2013), 76–85.