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A variational approach to the Navier-Stokes equations. (English. French) Zbl 1242.49063
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Summary: We propose a time discretization of the Navier–Stokes equations inspired by the theory of gradient flows. This discretization produces Leray/Hopf solutions in any dimension and suitable solutions in dimension 3. We also show that in dimension 3 and for initial data in H^1 , the scheme converges to strong solutions in some interval $[0, T)$ and, if the data satisfy the classical smallness condition, it produces the smooth solution in $[0, \infty)$.

MSC:

49M25 Discrete approximations in optimal control
35Q30 Navier-Stokes equations
76Y05 Quantum hydrodynamics and relativistic hydrodynamics

Cited in 4 Documents

Keywords:

Navier–Stokes equations; gradient flows; discretization; Leray/Hopf solutions; smallness condition

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