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10. Partial Differential Equations

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The problem of global smooth solutions for multidimensional Navier-Stokes equations solved

Existence of global solutions of the initial boundary value problem for the non-linear Navier-Stokes equations is established for the number of space dimensions $n \geq 3$ with velocities vector field in the anisotropic Sobolev space $W_{p,x,t}^{2,1}$ in case $(n+2)/3 \leq p < \infty$. No restrictions are imposed either on the time interval or on the values of appropriate norms of prescribed data. In case $n = 3$ the existence theorem covers the functional class with finite Dirichlet integral, implying existence of classically smooth solutions should the prescribed data be sufficiently smooth. The indirect proof is based on a new method of solving non-linear problems.