Oberseminar
Analysis und Theoretische Physik

Prof. Dr. Werner Varnhorn
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“On optimal initial value conditions for strong solutions of the Navier-Stokes equations”

Abstract:
Let \([0, T)\) with \(0 < T \leq \infty\) be a time interval and \(\Omega \subseteq \mathbb{R}^3\) a smoothly bounded domain. Consider in \([0, T) \times \Omega\) the non-stationary nonlinear Navier-Stokes equations with prescribed initial value \(u_0 \in L^2_\sigma(\Omega)\) and external force \(F = \text{div}F\) with \(F \in L^2(0, T; L^2(\Omega))\). It is well-known that there exists at least one weak solution of the Navier-Stokes system in \([0, T) \times \Omega\) in the sense of Leray-Hopf. Since we do not know if these solutions are unique it is an important problem to investigate conditions on the data \(u_0\) and \(f\) as weak as possible - to guarantee the existence of a unique strong solution \(u \in L^r(0, T; L^q(\Omega))\) satisfying Serrin’s condition \(\frac{2}{s} + \frac{3}{q} = 1\) with \(2 < s < \infty, 3 < q < \infty\) at least for \(T > 0\) sufficiently small. During the last years several sufficient conditions have been given, yielding step by step a larger class of corresponding local strong solutions. These conditions, however, need not to be necessary, in contrast to our result which is optimal in a certain sense and yields the largest possible class of such local strong solutions.

Dienstag, 18.06.2013, 15:00 Uhr, Raum g005
Hauptgebäude der Universität

Über Ihren Besuch würden sich freuen: Prof. Dr. Joachim Escher
Prof. Dr. Olaf Lechtenfeld
Prof. Dr. Elmar Schrohe
Prof. Dr. Christoph Walker