



Contributions to Current Challenges in Mathematical Fluid Mechanics

By Galdi, Giovanni P. / Heywood, John G.

Book Condition: New. Publisher/Verlag: Springer, Basel | This volume consists of five research articles, each dedicated to a significant topic in the mathematical theory of the Navier-Stokes equations, for compressible and incompressible fluids, and to related questions. All results given here are new and represent a noticeable contribution to the subject. One of the most famous predictions of the Kolmogorov theory of turbulence is the so-called Kolmogorov-obukhov five-thirds law. As is known, this law is heuristic and, to date, there is no rigorous justification. The article of A. Biryuk deals with the Cauchy problem for a multi-dimensional Burgers equation with periodic boundary conditions. Estimates in suitable norms for the corresponding solutions are derived for "large" Reynolds numbers, and their relation with the Kolmogorov-Obukhov law are discussed. Similar estimates are also obtained for the Navier-Stokes equation. In the late sixties J. L. Lions introduced a "perturbation" of the Navier Stokes equations in which he added in the linear momentum equation the hyper dissipative term $(-\Delta)^3 u$, where Δ is the Laplace operator. This term is referred to as an "artificial" viscosity. Even though it is not physically motivated, artificial viscosity has proved a useful device in numerical simulations...



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