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Asymptotic behaviour of solutions to Navier-Stokes equations with delays

In this talk we will show several methods to analyze the asymptotic behaviour of solutions to Navier-Stokes models when some hereditary characteristics (constant, distributed or variable delay, memory, etc) appear in the formulation. First some results concerning existence and/or uniqueness of solutions are established. Next the local stability analysis of steady-state solutions is studied by using several methods: the theory of Lyapunov functions, the Razumikhin-Lyapunov technique, by constructing appropriate Lyapunov functionals and finally by using a method based in Gronwall-like inequalities. Then the global asymptotic behavior of solutions can be analyzed by using the theory of attractors. As the delay terms are allowed to be very general, the statement of the problem becomes nonautonomous in general. For this reason, the theory of nonautonomous pullback attractors appears to be appropriate.