The Flow of a Viscous Liquid Past an Obstacle at Arbitrary Reynolds Number

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In this short course, I shall provide a ride through one of the oldest and most investigated problems in fluid mechanics, namely, the motion of a viscous liquid past a rigid obstacle. Assuming that the flow is uniform at large spatial distance (infinity) from the body, I will be mainly focused on the determination of the flow characteristics for Reynolds numbers, Re, of arbitrary size. Thus, besides the basic issue of existence, the latter will include the occurrence of (multiple) steady and time-periodic bifurcating solutions, along with a quick (and, unfortunately, to date still incomplete) glance at the behavior in the limit of very large Re. A number of open questions ("doable" and "un-doable") will also be presented.

Suggested Reading: G.P. Galdi and J. Neustupa (2016) *Steady–State Navier-Stokes Flow Around a Moving Body.* In: Giga Y., Novotny A. (eds) Handbook of Mathematical Analysis in Mechanics of Viscous Fluids. Springer, Cham.