

WELLPOSEDNESS FOR A MECHANICAL INTERACTION PROBLEM OF THE TYPE SOLID-FLUID

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ABSTRACT

In this talk, I will present a result on wellposedness on the Navier-Stokes initial-boundary value problem around a rotating obstacle, which has been developed in collaboration with Marius Tucsnak, professor of the university Henri Poincaré - Nancy I. The study of this problem represents the first step in the research of a mechanical interaction problem of the type solid-fluid. We have obtained an existence and uniqueness result, which is similar to that known for the classical Navier-Stokes equations for an isolated fluid (without the solid). Moreover, we have proved the global (in time) character of the solution in 2-D. The key step of the method that we use, in order to show the local existence, is to make a new change of variables instead of the simple rotation used in the most of the previous literature (for instance, Hishida '99, Galdi and Silvestre '04). We next linearize the problem, which is solved by means of the semigroup theory. We next carry out a fixed point procedure for concluding the local existence of the solution. Finally, by means of suitable a priori estimates on the solution, we prove that the solution is actually global in time in 2-D.