Fast rotation limit for the 2D density-dependent Euler system

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In this talk, we examine the effects of the high rotation for incompressible and non-homogeneous Euler equations, in two space dimensions. More precisely, the main goal is to perform the singular limit in the fast rotation regime, showing the convergence of the Euler equations to a *quasi-homogeneous* type system. To achieve this scope, the key point is to develop uniform (with respect to the rotation parameter) estimates not to deteriorate the lifespan of the solutions.

In this presentation, first of all, we show the well-posedness of the primitive problem in regular Sobolev spaces. Next, we focus on the description of the limit dynamics in the previous functional setting, depicting the *quasi-homogeneous* Euler system. At this point, we tackle the well-posedness issue for the limit system, recalling recall that, even if the quasi-homogeneous type equations are a coupled system of a transport equation for the density and a momentum equation with a non-linear term of lower order, the global existence of solutions remains an open problem. We will present an *asymptotically global* well-posedness result: for small densities, the quasi-homogeneous system behaves like the 2D incompressible Euler, then the lifespan of its solutions has to tend to infinity. The basic idea behind the asymptotically global lifespan of solutions, consists in taking advantage of improved estimates for linear transport equations in Besov spaces when the regularity index s is zero.

References

[1] G. Sbaiz: *Fast rotation limit for the 2-D non-homogeneous incompressible Euler equations*. J. Math. Anal. Appl., **512** (2022), n. 1, Paper n. 126140, 41 pp.