

On uniform resolvent estimates associated with time-periodic rotating viscous flow

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We consider the time-periodic viscous flow around a rotating rigid body. Since the linearization of this problem is not well-posed in a setting of classical Sobolev spaces, we introduce a framework of homogeneous Sobolev spaces where the corresponding resolvent problems are uniquely solvable. In the case of a pure rotation, one can further derive uniform resolvent estimates, which lead to the existence of solutions to the time-periodic problem. However, in the case of a rotating and translating body, the uniformity of the resolvent estimates requires additional restrictions, and the existence of time-periodic solutions merely follows if the two present oscillating processes are compatible, that is, if the rotational velocity of the body and the angular velocity of the time-periodic are rational multiples of each other.