

FREE BOUNDARY PROBLEM FOR INCOMPRESSIBLE VISCOUS FLUID FLOWS WITH SURFACE TENSION

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I will talk about local well-posedness and global well-posedness of one phase and two phase problem for the incompressible viscous fluids with surface tension. Domains are unknown, and so using the Hanzawa transform I reduce the problem to the fixed domain. To prove the local well-posedness, I use a new maximal L_p - L_q regularity theorem to avoid the smallness assumption on the initial data of velocity fields. Concerning the global well-posedness, in the case of one phase problem, I assumed that the reference domain is closed to a ball and the initial data are small enough. This result was already given in a conference in Nagoya last time. In the two phase problem, I assume that the reference body D_1 is a closed to a ball and that the reference body D_2 is given by $\mathbb{R}^N \setminus \overline{D_1}$, and so the reference body is $D_1 \cup D_2$ and the fluids are separated by a sharp interface $\mathbb{R}^N \setminus (D_1 \cup D_2)$ at the initial moment. Then, the global well-posedness is given under the assumption that the initial data are small enough.