Title: WELL-POSEDNESS AND LOW MACH NUMBER LIMIT OF THE FREE BOUNDARY PROBLEM FOR THE EULER-FOURIER SYSTEM

Abstract: We consider the free boundary problem for the Euler-Fourier system that describes the motion of compressible, inviscid and heat-conducting fluids. The effect of surface tension is neglected and there is no heat flux across the free boundary. We prove the local well- posedness of the problem in Lagrangian coordinates under the Taylor sign condition. The solution is produced as the limit of solutions to a sequence of tangentially- smoothed approximate problems, where the so-called corrector is crucially introduced beforehand in the temperature equation so that the approximate initial data satisfying the corresponding compatibility conditions can be constructed. To overcome the strong coupling effect between the Euler part and the Fourier part in solving the linearized approximate problem, the temperature equation is further regularized by a pseudo-parabolic equation. Moreover, we prove the uniform estimates with respect to the Mach number of the solutions to the free-boundary Euler-Fourier system with large temperature variations, which allow us to justify the convergence towards the free-boundary inviscid low Mach number limit system by the strong compactness argument.