

A well-posedness result of the Prandtl equations in 3-d

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The well-posedness of the three space dimensional Prandtl equations is studied both locally and globally in time under some constraint on its flow structure. It reveals that the classical Burgers equation plays an important role in determining this type of flow with special structure, that avoids the appearance of the complicated secondary flow in the three-dimensional Prandtl boundary layer. And the sufficiency of the monotonicity condition on the tangential velocity field and the favorable condition on pressure for the stability of boundary layers is illustrated in the three dimensional setting. Moreover, it is shown that this structured flow is linearly stable for any three-dimensional perturbation.

Joint work with Chengjie Liu and Tong Yang.