Stabilization to a nonstationary solution for the equations of fluid mechanics

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Abstract

In avoiding instabilities that can occur in the velocity of the fluid, a controller that stabilizes the equations to a given reference (desired) trajectory plays a crucial role.

The case of time-dependent reference trajectories is addressed; despite this case is important for applications, as the study that has been done in developing numerical tools to treat this case can confirm (see, e.g., [3] and references therein), the mathematical theory is not so developed as for the case of a time-independent reference trajectory (steady state), see [1] and references therein.

Some recent achievements are presented concerning the existence of a controller that exponentially stabilizes the equations to the given nonstationary reference trajectory. Further the controller is wanted to be finite-dimensional, supported in a given (small) open subset (either of the domain containing the fluid or of its boundary), and given in feedback form, see [2, 4, 5]; these are important properties for applications.

References

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