On the spectrum for linear artificial compressible system

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This talk is concerned with the stability of stationary solutions of the incompressible Navier-Stokes equation and the corresponding artifical compressible system. The latter system is a singularly perturbed system of the former one obtained by adding the time derivative of the pressure with a small parameter to the continuity equation. Both systems have the same sets of stationary solutions and the incompressible system is obtained from the artificial compressible one in the zero small parameter limit. It is shown that if a stationary solution is stable as a solution of the incompressible Navier-Stokes equation and the velocity field of the stationary solution satisfies an energy-type stability criterion by variational method with admissible functions being only potential flow parts of velocity fields,then the stationary solution is also stable as a solution of the artificial compressible system. This talk is based on a joint work with Prof. Takaaki Nishida (Kyoto Univ.) and Ms. Yuka Teramoto (Kyushu Univ.).