Konuşmacı (Speaker):
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Başlık (Title):
A stabilized finite element formulation of the eigenvalue problem associated with linear elasticity equations

Özet (Abstract):
We present and analyze a finite element formulation for the approximation of incompressible linear elasticity equations. We first consider the eigenvalue problem associated with the form-identical Stokes operator. The Galerkin method necessitates the use of inf-sup stable interpolations for the displacement and pressure which may not be convenient for a number of reasons. Aiming at circumventing the restrictions associated with the inf-sup condition as well as avoiding the volumetric locking in the incompressible limit, we propose a stabilized method that is based on the application of a subgrid scale concept. We obtain a priori error estimates for the eigenvalue problem by studying the convergence of the discrete solution operator towards the continuous one. Using this stable and optimally convergent method, we simulate the linear elastic behavior of incompressible elastic solids where the incompressibility constraint is enforced by incorporating the pressure gradient. Then, the algebraic version of the differential system that the results from the space approximation is studied. We obtain an error estimate when the representation of the solution in terms of the eigenfunctions is truncated. Ultimately, we show that the formulation possesses the important property to be a robust alternative in the incompressible limit. We furthermore present some numerical results which confirm these theoretical investigations.