

# Pairing Raviart-Thomas elements with conforming nodal elements in mixed finite element discretizations

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The mixed finite element method has been widely utilized for solving elasticity problems, encompassing the development of several element pairs and various formulation types. In particular, mixed finite elements were introduced to allow for the robust implementation of constraints. Traditionally, an inf-sup condition is required to guarantee compatibility between finite element spaces. However, the recent contribution [1] shows existence and uniqueness of the solution can be obtained even though the numerical scheme is inf-sup unstable. This poster aims to investigate the stability of the corresponding elasticity problem by closely examining the inf-sup condition for the continuous element pair  $(RT_0)^2 \times (P_1)^2$  introduced in [2]. By analyzing this specific combination of elements, we can shed light on the stability aspects of the problem at hand.

## References:

- [1] Daniele Boffi and Fleurianne Bertrand. A counterexample for the inf-sup stability of the  $RT^0/P^1$  in  $L_2H_1^0$  finite element combination for the mixed Poisson equation. Cambridge University Press, 2019. <https://onlinelibrary.wiley.com/doi/abs/10.1002/pamm.201900426>
- [2] Nils Viebahn, Karl Steeger, and Jörg Schröder. A simple and efficient Hellinger-reissner type mixed finite element for nearly incompressible elasticity. *Computer Methods in Applied Mechanics and Engineering*, 340:278–295, 201. <https://www.sciencedirect.com/science/article/abs/pii/S0045782518302901>

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