**Authors’ Replies to Reviewers’ Comments and Requests**

The authors would like to thank the reviewers for their comments and time in reviewing the manuscript. Their suggestions have helped us improve the quality of the manuscript.

**Note:** Reference, figure, equation, and page numbers used below are from the **revised** manuscript unless stated otherwise. Changes to the manuscript are denoted by red text, while green text highlights material from the original manuscript used to address reviewers’ comments.

**Comments from reviewers:**

**Reviewer #1:**

The manuscript presents a double hybrid formulation for two- and three-dimensional elasticity problems. The approximation spaces lead to a uniformly convergent scheme that is independent of the Poisson ratio. The resulting global system is symmetric and positive definite when applied to compressible solids and is a saddle-point problem for incompressible cases. A single mean pressure per element acts as a Lagrange multiplier to impose the incompressibility constraint.

The manuscript is well-written and clear. It also provides a thorough review of related works, highlighting the connection between the proposed formulation and the earlier works of the authors. Detailed convergence studies are presented in Section 6, with the one in Section 6.1 demonstrating the clear superiority of the proposed formulation over the popular Taylor-Hood formulation. Acceptance of the manuscript is recommended, and I have only minor clarification questions.

**Reply**:

Thank you for your positive feedback on the manuscript. Below, we address your comments.

1) The number of degrees of freedom in the global system depends on the number of element faces in a mesh. Thus, a mesh composed of hexahedron elements results in fewer degrees of freedom than one with tetrahedron elements, given the same number of nodes. This is demonstrated in the last problem solved in the paper. Local mesh refinement of hexahedron meshes generally leads to hanging nodes. Is the proposed formulation suitable for discretization with hanging nodes?

**Reply**:

Acredito que sim, o que acham?

2) Please check the definition of the L2 space given on page 3: Isn't component v\_1required to be in L2?

**Reply**:

Thank you for noticing that. We corrected the definition of the space.

3) Problem (39) is defined across six approximation spaces. Nonetheless, multiple degrees of freedom can be condensed at the element level. While this can be done in parallel, it is necessary to integrate all matrices and vectors listed in (41) before performing the static condensation to ultimately arrive at (47). Please comment on the overhead associated with these operations. How large must a problem be for the solution of the global system of equations to dominate the cost?

**Reply**:

Eu acho que não tem problema com hanging nodes. O que vocês acham?

4) Figure 11 and related discussion: Do the number of dofs used for the plots include the internal and external dofs, or only the external ones?

**Reply**:

Giovane, pode checar isso?

**Reviewer #2:**

This paper deals with an old problem, the calculation of quasi-incompressible elastic structures, which has been the subject of many works, starting with Herrmann's formulation (1965), and which can now be solved efficiently using FE industrial software

In this paper, which is of interest, is the adaptation of a numerical formulation that the authors have already proposed and developed in several papers to such elasticity problems, where, as in all approaches, pressure is considered as an additional unknown.

In the proposed formulation, called semi-hybrid-mixed formulation, only the normal component of the displacement is continuous, while the continuity of the tangent component is satisfied in a mean sense.

In view of the illustrations, the proposed numerical formulation works, but it seems no better than the classical ones.

**Reply**:

Thank you for the feedback on the manuscript and for mentioning the paper by Leonard R. Herrmann (1965). We added the reference to our manuscript. Below we address your comments.

Giovane, por favor adicionar a referência.

1-The title is too technical -it should be simplified

**Reply**:

Thank you for the suggestion. We changed the title to:

A Primal Double-Hybrid FEM for 3D Compressible and Incompressible Elasticity Using H(div)–L² Spaces

2- Formulation and notations

--index mistake in the definition of H1

-(u,v) :not defined

**Reply**:

Thank you for noticing about the definition of the H1 space, it has been corrected.

Giovane, por favor definir (u,v)

3-Taylor-Hood elements

Such elements are seen in the paper as a reference, which is highly debatable. They approximate the pressure by very regular functions that are not compatible with non-homogeneous structures. Moreover, in solid mechanics, one does not like to have k' > k - 1 where the pressure ( a stress) is approximated by polynomials of degree k' and the displacement by polynomials of degree k. It is worth noting that the authors ' approach is compatible with this remark.

**Reply**:

Não tenho certeza como responder isso.

4-Hybrid-mixed formulation

-(18):. To say that what's unusual is that the stress is not symmetrical

**Reply**:

Não entendi isso. Ele está dizendo que (18) implica que a tensão é simétrica?

5-Semi-hybrid-mixed formulation

-(28) is a particular equilibrium relation, only the resultant. A comment is needed

-It is not clear whether the proposed method is capable of calculating a symmetrical stress per element.

-The interest of the second hybridization of tangential stresses is not clear. A more detailed comment is needed

**Reply**:

Não chequei isso

6-Uniform stretch of a non-homogeneous solid

I don't share completely the authors' comments: it's obvious with two elements that the very classical formulations, in particular those implemented in industrial software, give the exact solution (k=1 for the displacement and k=0 for the pressure, per element). This should be true for all formulations.

It's obvious that Taylor-Hood elements don't work because of their abnormal regularity for pressure for non-homogeneous solids.

**Reply**:

Podemos motivar que o outro revisor gostou

7-Extension

Is it easy to extend the proposed formulation to large-displacement elastic problems?

**Reply**:

Acho que sim. Precisamos escrever uma resposta educada.