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A coupling strategy and numerical method for electro-chemo-mechanics of colloidal materials

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The electro-chemo-mechanical coupling exists widely in engineering and natural materials, especially in the gels and biological tissues. The paper aims to develop the constitutive model and numerical algorithm for investigating the electro-chemo-mechanical coupling behaviour of typical colloidal materials. Based on the developed coupling strategy, a FEM-based numerical procedure is proposed. The numerical examples are used to verify the proposed theoretical model and numerical method. The study has an important significance for understanding of the interaction mechanism of multifield coupling for typical colloidal materials.

Keywords: Electro-chemo-mechanics, Coupling, Colloidal materials, Numerical method