Weak imposition of frictionless contact constraints on automatically recovered high-order, embedded interfaces using the finite cell method

The finite cell method (FCM) is a fictitious domain approach that greatly simplifies simulations involving complex structures. Recently, the FCM has been applied to contact problems. The current study continues in this field by extending the concept of weakly enforced boundary conditions to inequality constraints for frictionless contact. Furthermore, it formalizes an approach that automatically recovers high-order contact surfaces of (implicitly defined) embedded geometries by means of an extended Marching Cubes (MC) algorithm. To further improve the accuracy of the discretization, irregularities at the boundary of contact zones are treated with multi-level hp-refinements. Numerical results and a systematic study of h-, p- and hp-refinements show that the FCM can efficiently provide accurate results for problems involving contact.