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IMPERFECT INTERFACE MODELING OF POTENTIAL AND ELASTICITY PROBLEMS WITH THIN LAYERS: RECENT THEORETICAL AND COMPUTATIONAL DEVELOPMENTS

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The talk will presents recent work of the authors related to theoretical and computational developments in modeling of potential and elasticity problems involving thin layers. It will be demonstrated that the use of higher order interface models allows for accurate representations of layers that are significantly softer or stiffer than the adjacent bulk materials or exhibit varying curvatures. The attractive feature of the proposed approach is that the jump conditions associated with the models up to the third order are provided in explicit forms. All developed models are compared with existing models of different orders, their limiting behavior is validated with respect to known interface regimes and material surface theories. Improved accuracy of the higher order models is illustrated for benchmark examples. The links between phenomenological- and asymptotic-based models will be revealed and some links between the imperfect interface models and the beam, shell, and plate theories will be established. The details related to the use of the developed models in computations with the use of multipole expansion method, as well as in BEM- and FEM-based computations will be discussed.

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