Isogeometric Analysis of Wrinkling

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Wrinkling is a phenomenon all around us. Besides being well-known in the context of cosmetics, wrinkling of membranes is a structural instability studied in multiple disciplines. From nanometer scale when studying the influence of wrinkles on the properties of graphene to kilometer scale when studying the influence of wrinkling on the structural stability of very large floating structures. From the aerospace for solar sails and space antennas, to the airspace for parachutes. From biomedical sciences studying wound healing to biological sciences studying brain morphology.

Since structural instabilities such as wrinkling are highly dependent on geometry as well as geometric imperfections, the role of the geometric description in computer simulations plays an important role. Therefore, isogeometric thin shell analysis provides an important tool in the analysis of the wrinkling phenomenon. Despite the momentum in isogeometric analysis in structural mechanics, wrinkling modeling remains a challenging topic, from the aspect of multi-scale analysis and the existence of multiple solution branches in the post-wrinkling regime.

This talk highlights the latest developments in the isogeometric analysis of wrinkling. It will provide a broad overview of the state-of-the-art of wrinkling modeling and applications, and it will present novel methods related to hyperelastic wrinkling modeling with isogeometric analysis, mesh adaptivity and complex domain modelling.

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