Lower dimensional models in elasticity

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To observe deformation of an elastic body which is much thinner in one or two directions using three-dimensional nonlinear and linearized elasticity equations has numerical and analytical disadvantages (even though those equations can be considered as correct). From a numerical point of view, the approximation can be correct only if elements are as small as the thickness of the body, so the number of elements is large and the computation can be expensive. From an analytical point of view, it is more natural to describe properties of the solution for the equations in a one-dimensional or two-dimensional domain. For that reason, lower dimensional models are used in that kind of situation.

In this talk we will present linear and nonlinear shell models of Naghdi type and a curved rod model. Additionally, properties of these models will be shown, together with various applications, such as optimization and body interaction modelling.