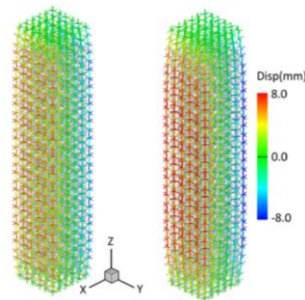


Bachelor Thesis

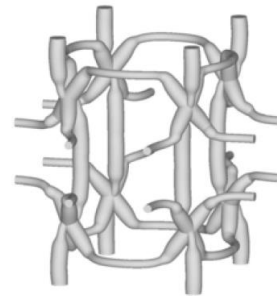
Implementation of nonlinear constitutive law in Timoshenko beams with extensible directors

Background

Periodic built-up structures or lattice structures with slender constituent ligaments have been widely investigated due to their low weight, high structural performances, and possibility of tailoring effective mechanical properties. For an efficient simulation of slender structures, beam models are often employed instead of three-dimensional (brick) element which typically requires extremely high computational costs. The geometrically exact beam model based on extensible directors extends conventional formulations in perspectives of (i) incorporation of in-plane deformation of cross-sections, (ii) additive configuration update, (iii) straightforward interface to three-dimensional constitutive equations without zero stress conditions, (iv) consideration of correct surface loads.



[Tension of lattice structures]



[Unit cell]

Aim

- Implementation of hyperelastic constitutive law like the Mooney-Rivlin material model
- Calculation of correct surface loads for beams with non-uniform cross-sections.
- Assessment of the accuracy and efficiency in comparison to brick elements

Contact