M2 Internship or/and PhD (2021-2022)

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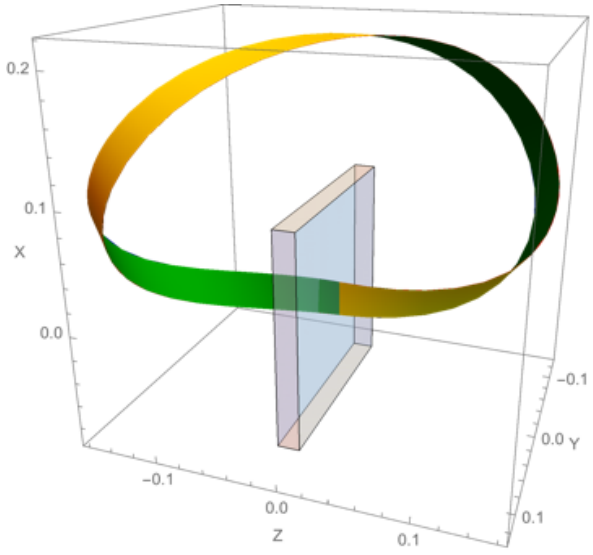
The extensible ribbon

the missing link between plate and beam models

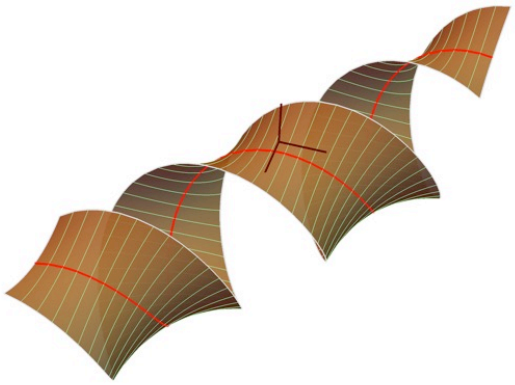
From cable plies and fashion accessories to hair ringlets, flexible band-shaped structures, namely ribbons, are widely present in our daily environment. While the mechanical study of ribbons was initiated in the 1930s, there is nowadays a renewed interest in the understanding and modeling of these fascinating structures.

Our team studies theoretically, numerically, and experimentally the statics and dynamics of elastic structures and in the present project we want to focus on the statics and bifurcation properties of a newly developed model of ribbon.

The work will involve theoretical characterization of the properties of the static solutions of the model (symmetries, singular points), but also the development of numerical codes to easily establish bifurcation diagrams for different classical setups (Moebius solutions, torsional buckling, etc).



Moebius-type solution with possible singular points



Extensible ribbon configuration with twist

These studies involve a mix of **theoretical** (buckling and bifurcation analysis), **modeling** (variational formulation, dimensional reduction), and **numerical** (minimization, ODEs, PDEs) approaches. Numerical work will use Python, Mathematica, or C.