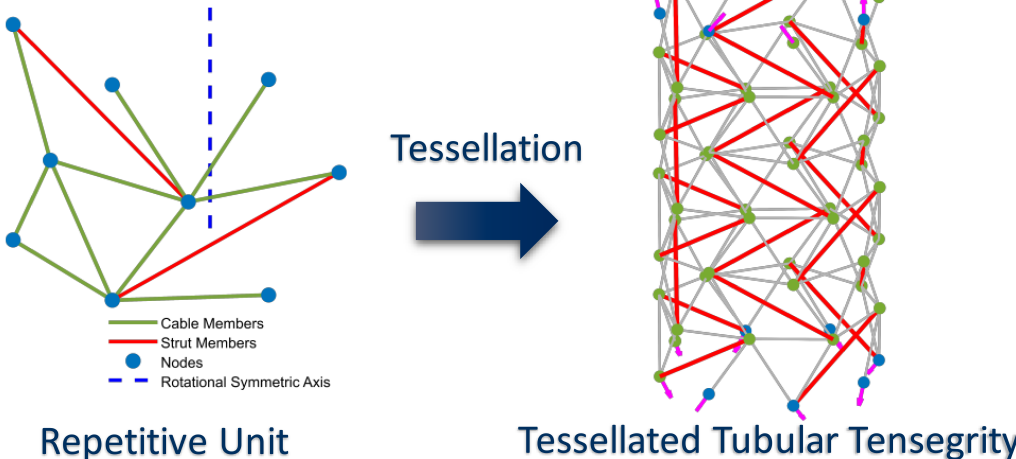# Form-Finding of Tessellated Tensegrity Structure

Keyao Song, Mark Schenk, Fabrizio Scarpa

Tubular tessellated Class-1 tensegrity structures are not globally in equilibrium because their single units are not self-equilibrated. It is necessary to identify boundary structures to provide the balance and to satisfy position and residual forces constraints. We present here a new method to solve the problem.
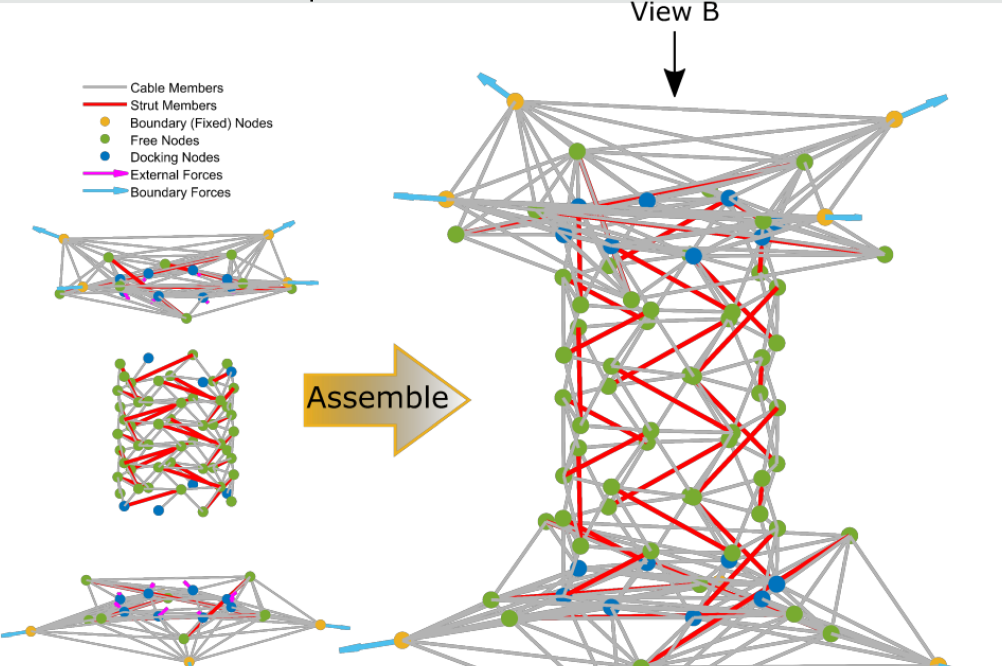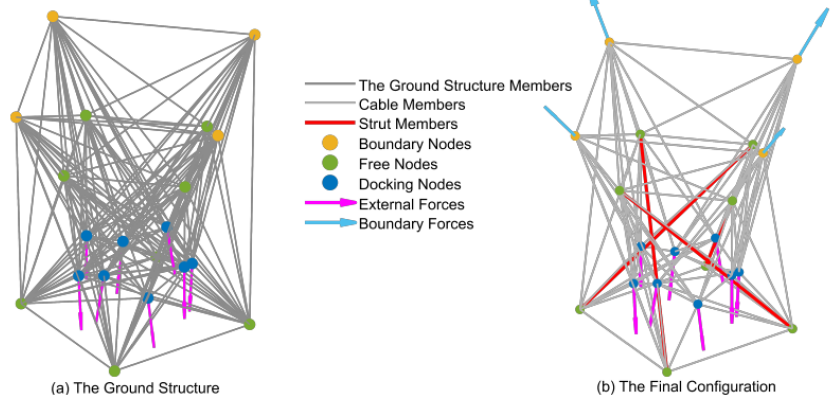
1.Tessellated Tensegrity Structure

- Adapted stiffness matrix form-finding method
- Class-1 tubular tensegrity
- Symmetric and translational constraints

Tessellation

Legend:
- Cable Members
- Strut Members
- Nodes
- Rotational Symmetric Axis

Repetitive Unit

Tessellated Tubular Tensegrity

2.The Boundary Structure

- The ground structure method with symmetry and class-1 constraints

Legend:
- The Ground Structure Members
- Cable Members
- Strut Members
- Boundary Nodes
- Free Nodes
- Docking Nodes
- External Forces
- Boundary Forces

(a) The Ground Structure

(b) The Final Configuration

3. Assembly: Tessellated Tubular Tensegrity Structure with Boundary Structures

Legend:
- Cable Members
- Strut Members
- Boundary (Fixed) Nodes
- Free Nodes
- Docking Nodes
- External Forces
- Boundary Forces

Assemble

View A

View B

View A

View B

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