MAE290A Homework
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Mitchell Truss of Order 4

The tensegrity plot of an order 4 Mitchell Truss is shown in Figure 1. In this case, the structure is neither potentially inconsistent nor undetermined. This implies that this structure is statically determined, meaning it is not pretensionable and the solution is unique.

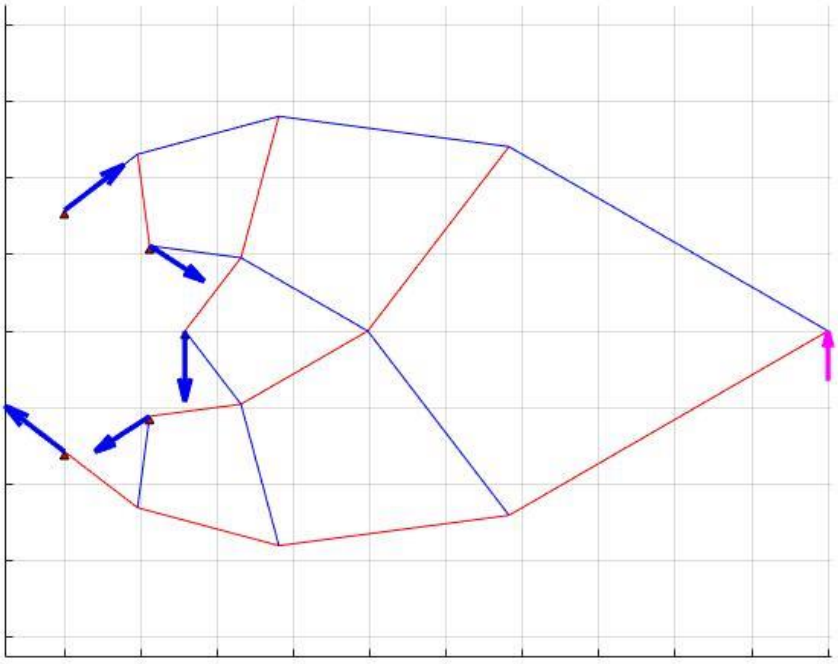

Figure 1, Tensegrity plot of a Mitchell Truss of Order 4

Non-minimal Prism with 4 bars

The tensegrity plot of a non-minimal Prism structure with 4 bars is shown in Figure 2. In this case, the structure is potentially consistent, implying the presence of soft modes. This implies the matrix constructed are not at full rank, this system will either has no solution or infinity solution.

Also, this structure is underdetermined with 3 DOF, meaning it has fewer independent equations than unknows, and three degrees of freedom, thus it is not expected to have unique solution under any external load profile.

This structure is not pretensionable, but tensionable under load. All members show zero load when we apply zero external force, but it can has a unique solution under certain external profiles (for example, when we apply opposite forces on the top nodes and bottom nodes).

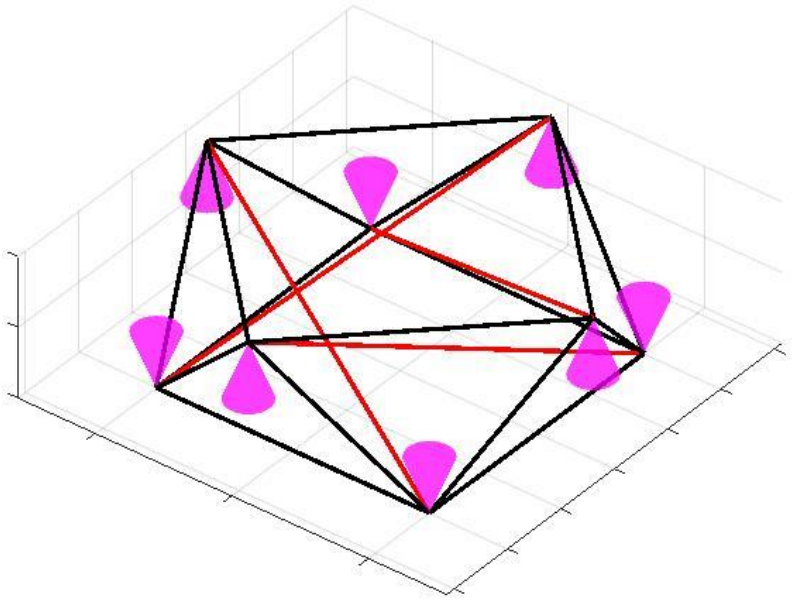

Figure 2, Tensegrity plot of a Non Minimal Prism with 4 bars