Optimization Workshop

Grasshopper Plugin Design Exercises

Download the example files available at http://www.build-opt.org/fod2017

IMPORTANT: You need to start Rhino using the desktop shortcut to load the plugin properly.
Once loaded type *Grasshopper* to load Grasshopper.

1. Revisiting the hand examples

Example 1 – Full design freedom
- Open example_1.gh in Grasshopper
- Check its workflow and make sure you understand it.
- *Enable* the solver to generate an optimized truss layout.

Example 2 – Reduced design domain
- Change the height to 25 by dragging the slider (note that if the solver is enabled, it solves the problem directly, which will lead to a slow user experience for large problems).
- This problem is also available from the download page as example_2.gh

Example 3 – Additional support
- Add a line of point supports to the left-hand side. To obtain a line of points, create a line at the left edge and divide it into equally spaced segments using *[Divide Curve]*. Then use these points as fixed point supports.
- Note that the plugin does not handle tree data at the moment. If you try to combine a list and a single item, Grasshopper will generate tree data instead. To avoid this, you can duplicate the point at the roller support using *[Duplicate Data]*.
- This problem is also available from the download page as example_3.gh

2. Check your hand drawn trusses (optional)

It is possible to check your layouts using the plugin, although this process is currently quite complex at present. Component *[Construct Topology]* can convert a set of lines to a truss and report its volume. There are various ways you can create lines; one way is outlined below:
- Bake all supported and loaded points to Rhino.
- Draw your other points in Rhino.
- You can then either create lines in Rhino or Grasshopper by connecting those points. Note that if you do this in Grasshopper, you can later move free points (i.e. not loaded or supported) in Rhino to automatically update your layout.
- Add these lines to *[Construct Topology]* and check its volume.
- A demo problem is available from the download page as userlayout.gh; you will also need to get the corresponding Rhino file userlayout.3dm to get the points.

3. 3D examples

Download and investigate other Grasshopper files available at http://www.build-opt.org/fod2017