Viewer Tool Manual

The Network Viewer tool can be used to load, view and manipulate nwk files.

1. **Push buttons on the property window:**
    - Load: Loads network (fMx, pMx, dia) or collection or STL files. STL files can be viewed, but other Viewer tool operations cannot be performed on them. Additionally, a small PNG file is generated for the loaded network, which can be used as an ICO file in Windows.
    - Clear: Prompts to clear one or multiple loaded networks/STL files.
    - Save Coll: Saves the current scene. A collection file is created, with details of each network/STL loaded, including filename, color, and view mode (cylinders or graph)
    - Save nwk: Saves the active network, prompts for a name, and creates fMx, pMx, and dia files.
    - Snapshot: Takes a snapshot of the current view, saved with the date and timestamp in the current matlab directory. The active network filename is displayed in the snapshot.

2. **Active Network:** A dropdown list on the Viewer window shows the filename of active network. All operations (labels, directions, ptselect, faceselect, bounding box, cylinders view, endpoints, endfaces, selections, face groups, properties) are performed on the active network. Users can select a different filename from the dropdown menu to change the active network. When the active file is changed, the current features will be applied to the new network (e.g., if toggleCylindersView is checked, cylinders will be drawn for the new network as well).

3. **Camera immersion features**
    - Scrolling**:** Zooms in and out on the current scene.
    - Right Mouse Click**:** Rotates the scene.
    - Left Mouse Click**:** Moves the scene horizontally and vertically.
    - Note: When either the FaceSelect or PtSelect feature is checked, the immersion features are temporarily disabled. Once both are unchecked, the immersion features can be used again.

4. **labelsOn**: The labelsOn feature displays labels for the current active file. For large networks with more than 1000 points or faces, it shows only 100 labels at a time. For smaller networks, all labels are displayed. Point labels start with ‘P’ and face labels start with ‘F’. This feature cannot be applied in the cylinders view..

5. **DirectionsOn**: This feature adds direction arrows to the current active graph. This cannot be applied in the cylinders view. This checkbox can be used to toggle directions on and off.

6. **faceSelect and ptSelect:** These features enable selecting a face or point on the active network to display their labels. With ptSelect, clicking on a point shows its label. With faceSelect, clicking on a point shows the label for the point and its connected faces.

7. **BoundingBoxOn** feature draws a bounding box around the active network. This checkbox can be used to toggle the bounding box on and off.

8. **toggleCylindersView** feature utilizes Thomas's RenderNwkTV function to draw cylinders around the current network. It applies even when only some faces are drawn. The color of the cylinders is determined by the face properties selected in the Properties tab, defaulting to diameter if not specified.

9. **EndPoints group** is used to display either none, inlet, outlet, or both inlet and outlet points. Inlet points are highlighted in blue with their labels, while outlet points are highlighted in red with their labels. This feature applies only when the entire graph is displayed, not just a subset of faces (as in selections view and faceGroups view). Checking all group checkboxes displays the entire graph.

10. **EndFaces group** is used to display none, inlet, outlet, or both inlet and outlet faces. Inlet faces are highlighted in blue with their labels, while outlet faces are highlighted in red with their labels. This feature applies only when the entire graph is displayed, not just a subset of faces (as in selections view and faceGroups view). Checking all group checkboxes displays the entire graph.

11. **Selections View** allows users to select specific faces and points using the faceEdit and pointEdit textboxes, where indices or logical conditions can be entered.
    a. **View Options:**
        - Both**:** Displays the entire graph in black, with selected faces and points highlighted in green.
        - Selections: Displays only the selected faces and points.
        - ~Selections: Displays faces and points not included in the selected list.
    b. **Buttons:**
        - Display**:** Updates the active graph view based on entries in faceEdit and pointEdit.
        - Reset**:** Clears text in the edit boxes, resets the view to 'Both', and redraws the graph using group colors.
        - Edit**:** Opens a new window with details for specified faces (group ID, in-point index, out-point index, diameter) and points (x, y, z coordinates). Values are editable; changes applied via 'Apply' update the graph and can be saved using 'Save nwk'. The Selected Face and point Indices are

expanded lists derived from values or logical conditions entered in text boxes. Edits here are temporary and do not apply elsewhere; they can be copied to the clipboard for future use.

12. **faceEdit**, The allowed formats in the textbox are:
    - Entries are separated by commas.
    - Entries can be:
        - Single integers (e.g., "12,23,18" for face IDs 12, 23, 18).
        - Ranges (e.g., "18:22" for face IDs 18, 19, 20, 21, 22).
        - Logical conditions:
            - Symbols: d (diameter), l (face length), f (face ID), g (group ID), p1 (inlet point), p2 (outlet point)
            - Operators: >, <, =
            - Combine conditions with "&".
            - Example usage:
                - "d>2&l<10" (Faces with diameter > 2 and face length < 10)
                - "f>10&f<15" (Faces with face ID between 11 and 14)
                - "g=13" (Faces with group ID equal to 13)
                - "p1=100" (Faces with inlet point ID equal to 100)

13. **ptEdit**, The allowed formats in the textbox are:
    - Entries are separated by commas.
    - Entries can be:
        - Single integers (e.g., "12,23,18" for point IDs 12, 23, 18).
        - Ranges (e.g., "18:21" for point IDs 18, 19, 20, 21).
        - Logical conditions:
            - Symbols: DGi (Indegree of a point), DGo (Outdegree of a point), p (point ID), X (X-coordinate of a point), Y (Y-coordinate of a point), Z (Z-coordinate of a point).
            - Operators: >, <, =
            - Combine conditions with "&".
            - Example usage:
                - "X<100&X>20" (Points with x-coordinate between 20 and 100).
                - "DGi=1&DGo=2" (Points with 1 indegree and 2 outdegree, bifurcation points).
                - "p>7" (Points with point IDs greater than 7).

14. **FaceGroup** tab displays all groups in the active network, showing the group ID followed by a color picker to adjust colors, and the number of faces in each group in brackets.
    a. Buttons:
        - Apply**:** Changes made to checkboxes and colors are applied only after clicking the apply button.
        - Reset**:** Resets all groups to different colors if they are currently in one color.
        - Rename**:** Prompts a window to select an old group ID and assign a new group ID, or paste face indices to change their group ID upon applying.

15. **Properties** tab, allows users to select a face property to color either the graph or cylinders view. Upon loading a network, the tool reads the location of the network files and searches for face properties such as .ff, .pp, .ppAv, .dia within that location. These properties are presented as selectable options in the tab. A default option named 'grp' enables coloring based on group IDs and their associated colors configured in the FaceGroup tab. When a face property is chosen, the tool assigns colors to the view based on the property values, ensuring that nearby values are depicted with similar or corresponding colors.

16. **Report** file named 'viewerReport.txt' is created to log user operations in the order they are performed, including timestamps and operation details. If the file doesn't exist, it is created, and new entries are appended to it if it already exists.

17. **Collection file**, allows for loading multiple objects with specified options for each:
    - **Key-Value Pairs:**
        - filename**:** Specifies the absolute path of the fMx file of a network or an STL file.
        - color**:** Specifies a color name accepted in MATLAB, choosing from {'red', 'blue', 'green', 'cyan', 'magenta', 'yellow', 'black'}. If an invalid name is given, black is chosen by default. This option is only applicable for fMx files; for STL files, it is ignored.
        - view**:** Specifies the view mode, which can be graph or cylinders. This option is only applicable for fMx files; for STL files, it is ignored.

    Example collection file:

```
filename=/Users/lavanyavaddavalli/Desktop/lppd/data/coll/S58_bba_SM_2023/
S58_bba_SM_2023.fMx,color=red,view=cylinders
filename=/Users/lavanyavaddavalli/Desktop/lppd/data/coll/S58_bbv_SM_2023/
S58_bbv_SM_2023_new.fMx,color=blue,view=graph
filename=/Users/lavanyavaddavalli/Desktop/lppd/data/coll/S58_bba_SM_2023/
S58_bba_SM_2023_GR.stl
```

18. **Shortest Path**, this feature is located in the **Path** tab. You can select any two points in the active network; if a path exists between them, the tool calculates and highlights the shortest route in green. If no path is found, nothing is highlighted.

19. **Connected components**, this feature is located in the **Path** tab. Connected components in the graph are identified, with each component assigned a unique, randomly chosen color. A bar graph indicates how many points are contained in each connected component. An alternate mode displays how many faces appear in each connected component.