How to use FEKO with Altair HyperMesh

HyperWorks®

This How To applies to: FEKO Suite 6.2, HyperMesh 11.0

Users who would like to make use of the benefits of the advanced meshing features of Altair HyperMesh while solving the electromagnetic aspect of the problem in FEKO, have several options to transfer the mesh from HyperMesh to CADFEKO. The recommended options are described below, as well as a brief description how to complete the model setup in FEKO.

Exporting meshes from HyperMesh for FEKO

In addition to basic element information (nodal coordinates and element types, e.g. shells or solids) a proper mapping of the HyperMesh property to the corresponding FEKO label is desired.

There are two recommended options to export a HyperMesh mesh file for further import into CADFEKO:

1. Using HyperMesh User Profile *ABAQUS Standard3D*

- This is the recommended way of exporting models from HyperMesh for further use in FEKO.

- Select User Profile *ABAQUS Standard 3D* (*Preferences -> User Profile*):
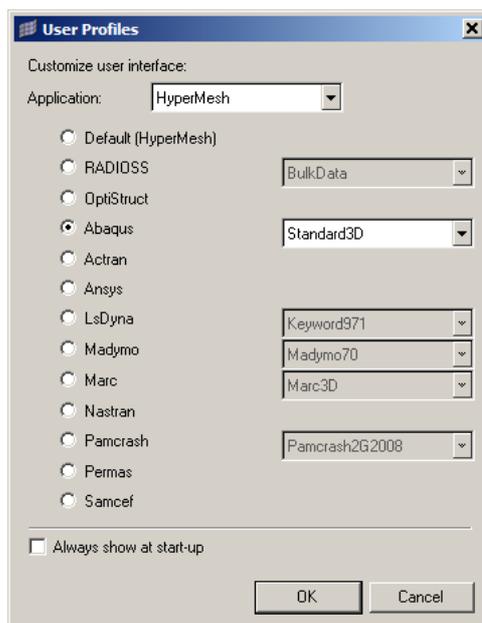
- Mesh and setup your model in HyperMesh using components assigned to properties (card image *SHELLSECTION* or *SOLIDSECTION*). HyperMesh properties are equivalent to FEKO labels. Property names will be maintained as FEKO labels. Material definitions and other needed parameters can then be defined in CADFEKO.

  Supported element types are first order quads, trias and tetras. Quad elements will be split during the CADFEKO import into two trias along the shortest diagonal. CADFEKO does not support the import of hexa elements.

- Export the solver deck (*File -> Export -> Solver Deck*):
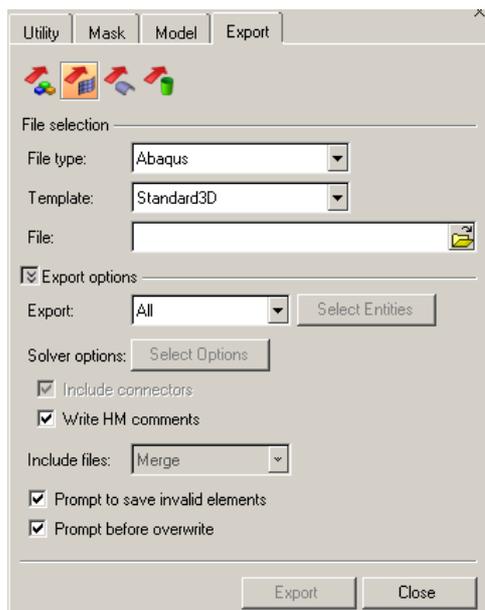
  Select arbitrary file name and file location. File suffix *.inp* is recommended.

2. Using HyperMesh User Profiles *RADIOSS Bulk Data* or *NASTRAN*

- Select User Profile *RADIOSS Bulk Format* (*Preferences -> User Profile*):
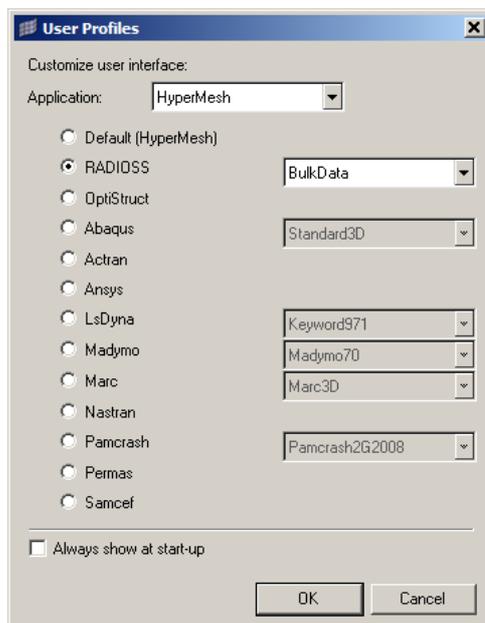
- Mesh, setup and export your model in HyperMesh using components assigned to properties (card image *PSHELL* or *PSOLID*). HyperMesh properties are equivalent to FEKO labels.

  Since RADIOSS and NASTRAN support only integer values for properties (PIDs), only property IDS will be maintained as FEKO labels, but not property names. Material definitions and other needed parameters can then be setup in CADFEKO.

  Supported element types are first order quads, trias and tetras. Quad elements will be split during the CADFEKO import into two trias along the shortest diagonal. CADFEKO does not support the import of hexa elements.

- Export the solver deck (*File -> Export -> Solver Deck*):
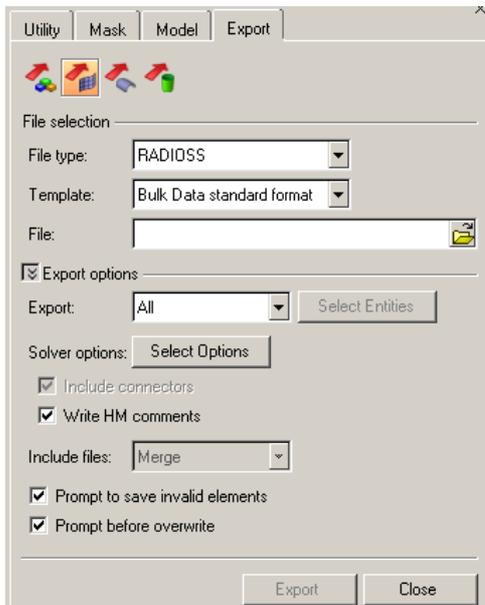
  Select arbitrary file name and file location. File suffix *.nas* is recommended.

Working further with the HyperMesh exported mesh in FEKO

To import an external mesh into CADFEKO, go to File -> Import -> Mesh, then choose a suitable option:
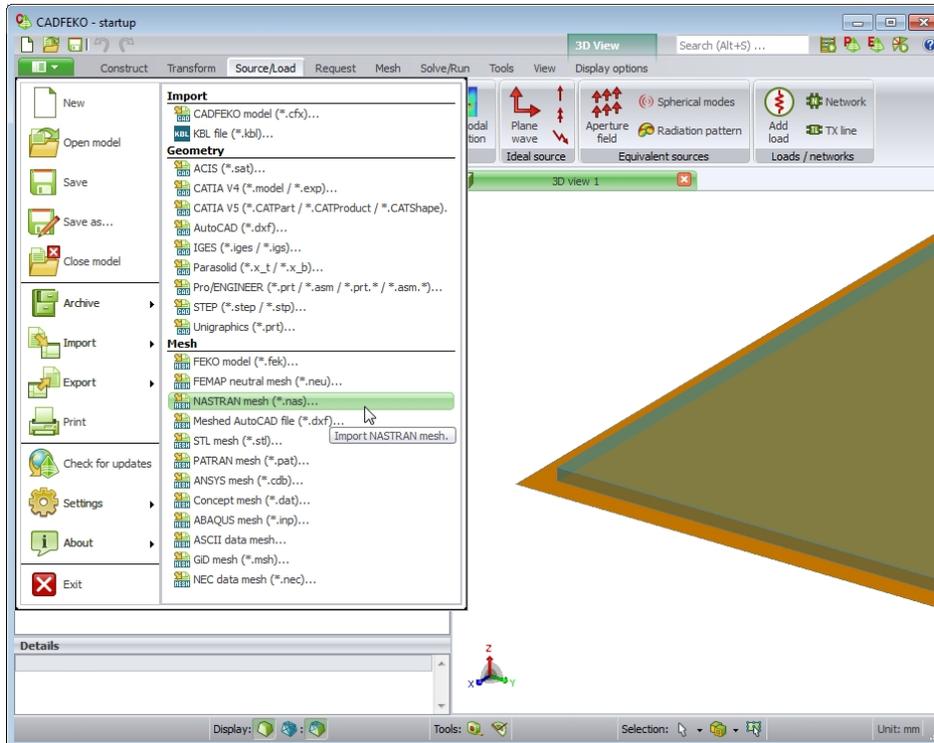
Once the mesh has been imported into CADFEKO, users can add ports in CADFEKO.
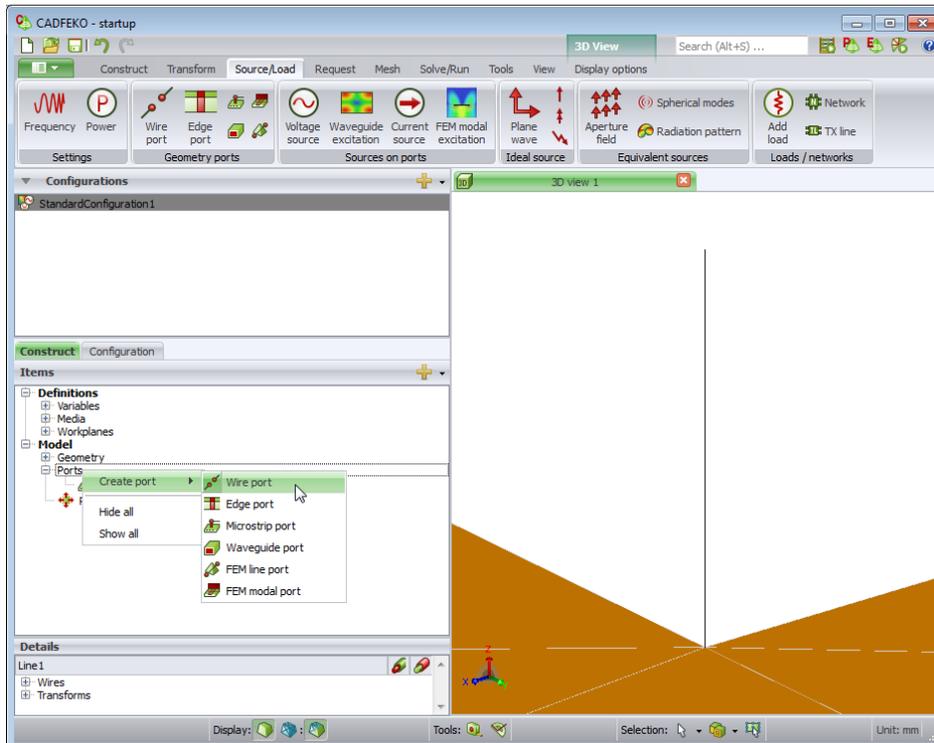
Adding voltage sources, far field requests, etc. is done in exactly the same manner as when working with native CADFEKO geometry/meshes.

To connect additional geometry (e.g. antenna placement on a structure) or maybe import a second mesh to the already imported HyperMesh mesh, use the snapping function, possibly in combination with the align tool. CADFEKO uses a powerful auto-snapping algorithm.
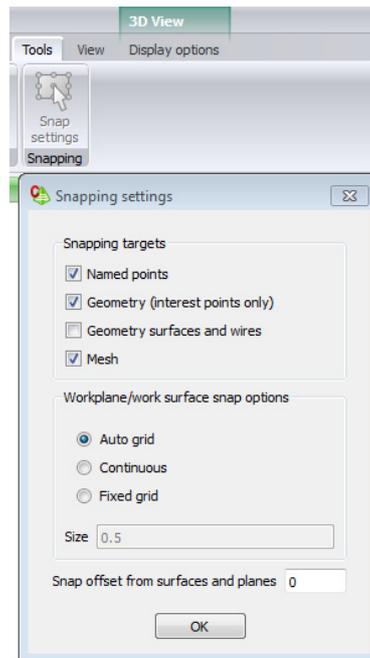
Snapping enables the selection of special points from the 3D view. When pressing <Ctrl><Shift> and hovering over the model with the mouse cursor, special snapping points near the mouse cursor will be indicated by blue dots. The active snapping point is indicated by a black dot and can be selected by pressing <Ctrl><Shift> and mouse clicking on the current point. The special snapping points include: named points, geometry points, geometry face centre, geometry edge centre, grid and mesh vertices. To snap to a mesh vertice, ensure the mesh is visible in the 3D view and that mesh vertices are being displayed.

If the mesh size is not desirable for the frequency, users can either remesh the model in HyperMesh or simply just to create the mesh using a different mesh size in CADFEKO. CADFEKO will automatically remesh the model for the desired operating frequency band, also taking higher order basis functions into account (if applicable).