Section
6

Frequently Asked Questions

I. General questions about running GridTool

1. ***Q: How can I get a copy of* GridTool*?***
A: Fill out the online request form at `http://geolab.larc.nasa.gov`

2. ***Q: How do I report my comments/suggestions/questions?***
A: Contact Stuart Pope (d.s.pope@larc.nasa.gov 757-864-5775)

3. ***Q: Where can I find the latest version of the on-line user's manual?***
A: http://geolab.larc.nasa.gov/GridTool/GridTool_Doc.html

4. ***Q: What are the system requirements to run* GridTool*?***
A: The code has been tested successfully on IRIS workstations running IRIX5.3 and above. Since the memory is allocated dynamically, memory size will depend on the complexity of geometry/grid.

5. ***Q: Is there interactive help while using* GridTool*?***
A: There is limited on-line help which can be activated by pressing the [Help] button in the *Main* panel which will open a browser. As the user moves the cursor over any object in the panels, an Object description will be given in the browser. Also, you may use the [How To] button in each panel to access sections of the user's manual.

II. Questions concerning input/output(*I/0* panel)

6. ***Q: How can I read/write a file into/from* GridTool*?***
A: Press the [I/O] button on the *Main* panel. Either type the file name in the {File Name} clickable text, or select it from the File browser. Select the [File Type] and [File Format]. Push [Read/Write].

7. ***Q: How can I read/write a .d3m file for VGRID system?***
A: Type in the project name in {Project} input field, select .d3m (VGRID) from the [File Format] menu and push [Read/Write].

8. ***Q: How can I write the NURBS surfaces as GRIDGEN surfaces?***

A: Turn the desired surfaces on in the display window, select "ASCII" or "binary" from the [File Type] field, select "gridgen" from the [File Format] field, and then press [WRITE].

9. ***Q: What IGES entities can* GridTool *read?***

A: **GridTool** is capable of accepting only the following entities:

Copious data (entity 106)
Lines (entity 110)
Parametric Splines (entity 112)
Parametric surface spline (entity 114)
Matrix (entity 124)
NURBS curves(entity 126)
NURBS surfaces (entity 128)
Trim Curves(entity 142)
Trim Surfaces(entity 144)

10. ***Q: Is there any approximation involved in bringing IGES entities into* GridTool*?***

A: There is no approximation involved in bringing IGES entities into GridTool.

11. ***Q: How do I read into* GridTool *an unstructured surface grid?***

A: Use the *I/O* panel to read the grid as a *VGRID* or *FELISA* Front file.

III. Questions concerning viewing, display properties, and entity selection(*Surfaces* and *Controls* panels)

12. ***Q: What is a display path?***

A: In GridTool a surface is defined everywhere via a NURBS surface. In order to display it, lines are drawn on the surface. These displayed lines constitute the display paths for the surface.

13. ***Q: How do I turn on/off surfaces?***

A: Press [Surfaces] on the *Main* panel. To turn on/off a single surface, set [Selection Type] to "Single", make selection from the [Display Type] menu, place the cursor over the surface number in the ON/OFF window, and click with any mouse button. To turn on/off a family or all surfaces, set [Selection Type] to "family" or "all", then select from the [Display Type] menu.

14. Q: How do I make a surface active?
A: Either place the cursor over the desired surface in the DISPLAY WINDOW, and hit the [s] key, or activate the *Surfaces* panel from the *Main* panel, set [Selection Type] to "Single", and select "Active Surface" from the [Display Type]. Place the cursor over the surface number in ON/OFF window and click any mouse button.

15. Q: How do I group surfaces together?
A: Turn on the surfaces to be grouped, enter a family name and push [Change Family].

16. Q: How do I change the directions on the surfaces?
A: Turn on the desired surfaces, then push [Switch Dir].

17. Q: How do I change the background color?
A: Push [Background]. The color can be changed by moving the three sliders for the colors or by entering the RGB color number (Red, Green, Blue) in the input fields.

18. Q: How do I change the surface color?
A: Turn on the desired surfaces. Change the color using the three sliders for colors or by entering the RGB color number in the input fields.

19. Q: How do I change the number of display paths?
A: Turn on the desired surfaces. Enter the desired number of Display paths in U and V coordinates in the input field [Number of Display Paths]. Press the [Change DP] button.

20. Q: How do I convert the existing display paths to a NURBS surface?
A: Turn on the desired surfaces and push [DP to NURBS]. This will not delete the original surfaces but append the NURBS surfaces to the bottom of the list.

21. Q: How do I delete surfaces?
A: Turn on the desired surfaces, then push [Delete Surfaces].

22. Q: How do I change the center of rotation?
A: The center of rotation can be changed using the *Controls* panel, or using hot keys (see Section 7).

23. Q: How do I reset the image?
A: Use either the hot key [r] or the [Reset] button in *Viewing*

Controls panel.

24. ***Q: How do I translate/rotate/zoom?***
A: Either the hot keys or *Viewing Controls* panel can be used to translate/rotate/zoom the object.

25. ***Q: How do I change the rotation/translation rate?***
A: The rotation rate can be increased/decreased by pushing the buttons to the left and right of [Rot] and [T/Z] in the *Viewing Controls* panel. This is the real time rotation of the display. Every time this button is pressed, the rotation rate is changed by a factor of three. To reset the rate, press the [Rot/T/Z] buttons.

26. ***Q: How do I change the mouse to PLOT3D mode?***
A: Push [PLOT3D] in the *Viewing Controls* panel. Plot3D mode can be made the default mouse setting by having a line in the resource file containing the word "plot3d".

IV. Questions concerning curves(*Points/Curves* and *Patches* panels)

27. ***Q: How do I create a curve?***
A: To start a new curve, press [Next Curve] on the *Points/Curves* panel.

28. ***Q: How do I add a point to an existing curve?***
A: To create a new point for a curve, press [Next Point]. This newly created point becomes the active point will be placed where the last point was. The user can then move this point to any location. The active point can be moved to an existing point on a curve by placing the cursor over the desired curve point and hitting the hot key [m]. Similarly, the active point can be moved to a display path intersection on the active surface by placing the cursor over the display path and hitting the hot key [t]. The active point can be moved to any location on the active surface by: (1) typing the parametric coordinates in the U & V input box, (2) moving the U & V positioner, or (3) moving the "U & V" sliders. In order to move the active point in space, the point should first be converted to an "XYZ" point by pressing [On Surface]. Once converted, the x, y, and z sliders can be used to move the point to anywhere in the space. It is also possible to change the coordinates by typing values in the input fields.

29. ***Q: How do I make a point active?***
A: Place the cursor over the point and hit the hot key [p].

30. ***Q: How do I delete or project a point?***
A: First turn on the desired projection surface(s). Make the point active, then push [Delete Point] or [Project Point] on the *Points/Curves* panel.

31. ***Q: How do I insert a point?***
A: A point can be inserted ahead of the active point on a curve by pressing [Insert Point]. The new point becomes active, and if the two neighboring points are on the same surface, the inserted point will also be on that surface.

32. ***Q: How do I convert a surface point to an XYZ point?***
A: In order to move the active point in space, the point should first be converted to an "XYZ" point by pressing [On Surface]. Once converted, the x, y, and z sliders can be used to move the point anywhere in space. It is also possible to change the coordinates by typing the values in the input fields.

33. ***Q: How do I change the coordinates of an existing point?***
A: The active point can be moved to any location on the active surface by: (1) typing the parametric coordinates in the U & V input box, or (2) moving the U & V positioner, or (3) moving the U & V sliders. In order to move the active point in space, the point should first be converted to an "XYZ" point by pressing [On Surface]. Once converted, the x, y, and z sliders can be used to move the point anywhere in space. It is also possible to change the coordinate by typing the values in the input fields.

34. ***Q: How do I split a curve?***
A: Make the curve active. Make the point at which the curve will split active. Push [Split Curve].

35. ***Q: How do I combine two curves?***
A: Make the first curve active. Push [Combine]. Make the second curve active. Push [Combine Curves].

36. ***Q: How do I copy/project/smooth/delete a curve?***
A: Make the curve active. Push [Copy/Project/Smooth/Delete] on the *Points/Curves* panel.

37. ***Q: When I project a curve, is the original curve lost?***
A: Yes. Projecting the curve changes the original. A good practice is to first make a copy of the curve if the original is to be kept.

38. Q: How do I extract edges of an existing surface?

A: Turn on the desired surfaces. Push [Auto Edge] on the *Points/Curves* panel.

39. Q: How do I collapse the endpoints of curves that are close?

A: Activate the point to which nearby points should be collapsed (to within the gap size). Enter {Gap Size}. Push [Collapse Points].

40. Q: How do I delete unused curves?

A: Push [Delete Unused] of the *Points/Curves* panel. 'Unused' curves are those which are not part on any defined patch.

41. Q: How do I turn on/off all curves?

A: Toggle [All Curves] on the *Patches* panel.

42. Q: How do I enrich points on an existing curve?

A: Make the curve active. In the input field beside [Enrich], enter desired number of points between each existing point (e.g. -2, will put 2 points between each existing point). Push [Enrich].

43. Q: How do I redistribute points on an existing curve?

A: Make the curve active. Activate the *Distribute* panel from *Points/Curves* and enter desired number of points for the curve. Enter the end spacings (-1 for default). Push [Distribute].

44. Q: How can I tell if I have defined the same curve (or patch) twice?

A: Place the cursor over the curve (or patch) in question, and hit the [c] hot key ([f] for patches). If there is more than one curve (or patch) at that location, different curve (or patch) numbers will appear in the "Curve #" (or "Patch #") buffer of the *Points/Curves* panel (or *Patches* for patches).

V. Questions concerning projection

45. Q: Why are the projection properties used?

A: Some surfaces may have an irregular parameterization or may be very complex. In order to successfully project to these surfaces, the projection properties of the surfaces may have to be adjusted.

46. Q: How do I change the projection properties of a surface?

A: Activate *Projection Properties* from the *Surfaces* panel. Make the surface active. Change the property.

47. ***Q: How do I change the projection properties of all displayed surfaces?***

A: Activate *Projection Properties* from the *Surfaces* panel. Turn the surfaces on. Change the property for one of them. Push [Set Displayed Surfaces].

48. ***Q: How do I project the front?***

A: Turn on the desired surfaces and triangulated patches and press [Project].

49. ***Q: How do I undo a projection?***

A: Turn on the triangulated patches and pres [Undo].

50. ***Q: How do I undo a projection after the front files are updated?***

A: Read in the unprojected front as a "Front Update" from the {File Format} field and then proceed to undo the projections.

51. ***Q: How do I check the projected surface grid?***

A: In the *Unstructured Grid* panel, press [Front]. "dmax" shows the maximum distance the front has moved. Select a positive number, d < dmax, in the "Distance" input field. This will display the triangles that have moved a distance between d and dmax (i.e., triangles that have vertices that have moved by at least a distance d).

52. ***Q: How do I turn on/off an individual patch?***

A: From the *Unstructured Grid* panel, press [Front]. Then select the Patch from *Patch Number* input field and press [Front On/Off].

53. ***Q: How do I turn on/off a family of patches?***

A: Select the family and press [Turn On/Off Family].

54. ***Q: The projected grid is messed up. How can I fix it?***

A: Quality of surface projection depends on the surface parameterization. You can fix your problem by either increasing the number of display paths on the NURBS surfaces, or by changing the projection speed. To change the speed, activate the *Projection Properties* panel, make the surfaces active (one at a time), and change {Speed} to 1.

55. ***Q: How do I project a structured grid onto NURBS surfaces?***

A: Read the grid as point definition (plot3d, gridgen, or lawgs). Read in the NURBS surfaces, and turn on the surfaces to which the grid will be projected. Make the grid active, activate the *Structured Grid* panel, and select the part of the grid to be projected using imin, imax, jmin, jmax. Press [Project].

VI. Questions concerning patches(*Patches* panel)

56. Q: How do I create a patch?
A: In the *Patches* panel, select a family name and boundary condition. Push [Next Patch].

57. Q: How do I make an existing patch active?
A: Either enter the patch number (in {Patch #}), or place the cursor over the patch and hit the [f] hot key.

58. Q: How do I select the patch boundary condition?
A: Put the cursor over the {BC} input-field of the *Patches* panel. Use the right mouse to display and select the boundary condition. Every time a new patch is created, it will (by default) be associated with the values of the "BC" and "Family" that were in the buffers at that time. In order to change the BC and/or Family association of an existing patch, make the patch active and press [Apply BC/Family] after having entered the desired values.

59. Q: How do I create patches automatically?
A: Turn on the surfaces to be patched. Enter a family name. Select a boundary condition using the right mouse button. Select the number of patches in each direction. Press the [Auto Patch] button.

60. Q: How do I convert a 3 or 4-sided patch to a NURBS surface?
A: Make the patch active and push [Patch to Surface].

61. Q: How do I reverse/delete an existing patch?
A: Make the patch active and press [Reverse] or [Delete].

62. Q: How do I delete a family of patches?
A: Select the family name from the {Family} input field and press [Delete Family].

63. Q: How do I associate a patch and a surface?
A: Make the patch active, turn the surface on, and push [Accept Surfaces].

64. Q: How do I split a patch?
A: Make the patch active. Create a curve that splits the patch and

make this curve active. Press [Split Patch].

65. ***Q: How do I add an edge to an existing patch?***
A: Either make the curve active or use [Find Edge] to find the next curve and press [Accept Edge].

66. ***Q: How do I make an existing edge active?***
A: Use the input field {Edge #}.

67. ***Q: How do I find the next edge?***
A: Push [Find Edge].

68. ***Q: How do I reverse/delete/connect an edge?***
A: Make the edge active and press either [Reverse], [Delete], or [Connect Edge].

69. ***Q: How do I split an edge?***
A: Make the splitting point active and press [Split Edge].

70. ***Q: How do I automatically create a box which covers the geometry?***
A: Push [Box] button which opens a panel and enter minimum and maximum values for the Box. Press [Create Box].

71. ***Q: How do I fix directions of all patches automatically?***
A: Select one patch with the correct direction and press [Fix Patches].

72. ***Q: How do I change a patch type?***
A: Enter the desired type into the {Patch Type} input field.

73. ***Q: How do I get more information for a patch?***
A: Activate [Help] from the *Main* panel, press [Bad Patches] and move the cursor over the [Bad Patches]. Information for the active bad patch will be displayed.

74. ***Q: How do I turn on/off patches?***
A: Toggle [All Patches].

75. ***Q: How do I check to see if there are any bad patches?***
A: Pres [Bad Patches]. All bad patches will be displayed.

76. ***Q: What are bad patches and how can I fix them?***
A: A patch is bad if a curve is used more than twice (this may not create a problem), a curve is used twice in the same direction (to fix, reverse the edge direction of the bad patch), the patch is not closed (either there is a gap between the edges or the "tol"

is low. Use [Collapse Points] in *Points/Curves* panel to fix), the patch is n-sided and it is not a planar patch (the patch may be slightly off the plane. This depends on tol), there is no surface associated with the patch (FELISA), or there are not enough points for the patch.

77. Q: What is the Shrink panel for?
A: A patch can be shrunk for display purposes. This will not effect the data.

78. Q: How can I create a symmetry patch (two loops)?
A: Make the patch on the symmetry active (this is often one side of a box). Make one of the curves on the body/symmetry active (second loop) and accept that curve as a edge. Make sure the direction is OPPOSITE to the patch boundary in this case. The final patch will have two loops: (1) outer loop from the box, (2 the inner loop from body/symmetry. Continue accepting all the curves on the symmetry until the second loop is closed as well.

VII. Questions concerning sources

79. Q: How do I create a source?
A: Press [Next Source]. This will create a source similar to the last source (if this is the first source, it will create a nodal source and place it in the middle of the domain). The location of a source can be moved using the same technique as for moving points. The value spacings, "S1" and "S2", are the sizes of ideal tetrahedrals for the source locations. An excellent description of parameters "a_n", "b_n", "alpha" can be found in Ref. 4.

80. Q: How do I make a source active?
A: Place the cursor over the source and use hotkey [b].

81. Q: How do I make an end point of a linear source active?
A: Either place the cursor over the end point of the source and press the [b] hotkey, or use {Source Number} input field.

82. Q: How do I delete a source?
A: Make the source active and press [Delete Source].

83. Q: How do I change a nodal source to linear and visa versa?
A: Make the source active and press [Nodal Source].

84. Q: How do I move a source location?
A: Activate the *Background Grids* panel. Move the cursor over the source location and press the [b] hotkey. Change the value in

the *Points/Curves* panel. For linear sources, repeat these steps for the other end.

85. ***Q: How do I change the properties of a source?***

A: Make the source active and enter the value in the *Background Grids* panel.