**Notes on multiple integration point visualization**

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An initial implementation of a new capability has been developed in Griz to support multiple integration points and results organized by element sets. Following is an overview of the data organization and new commands for using multiple integration points. Currently this is implemented only for shell elements.

**(1) Accessing Primal Results**

The primal result options will appear in the pull-down menus as follows:

Shell -> Element Set 1 (es\_1) -> Int Point 1 (Label 1)  Inner -> X Stress (sx)

                                                                           Y Stress (sy)

                                                                           Z Stress (sz)

                                                                           XY Stress (sxy)

                                                                           YZ Stress (syz)

                                                                           ZX Stress (szx)

                                                                           eps

Int Point 2 (Label 20) -> X Stress (sx)

                                                                           Y Stress (sy)

                                                                           Z Stress (sz)

                                                                           XY Stress (sxy)

                                                                           YZ Stress (syz)

                                                                           ZX Stress (szx)

                                                                           eps

Int Point 3 (Label 40) Outer

           Element Set 2 (es\_2)

           .

           .

           Element Set *n* (es\_*n*)

Each integration point will be labeled as Inner, Middle, or Outer if it matches an actual inner, middle, or outer integration point. If it does not match then no default surface is displayed. Note in the example above there is no default middle surface listed for Label 20.

To show the primal result for an element sets integration point *n* enter the following:

  show es\_1[*n, comp*] - where *n* is the integration point and *comp* is the

   result component; for example, show es\_1[1,sy]

**(2) Accessing Derived Results**

The derived data will appear in the pull-down menus as:

  Shell -> Element Set 1 (es\_1) -> X Stress (sx)

                                   Y Stress (sy)

                                   Z Stress (sz)

                                   XY Stress (sxy)

                                   YZ Stress (syz)

                                   ZX Stress (szx)

The derived result will use the global reference surface switch for selecting the Inner/Middle/Outer surface for the chosen element set. It is possible to have an undefined default surface setting for any or all of the surfaces for an element set. If the user attempts to show the result for a surface that is not defined in the primal data, then a warning will be displayed and no result will be rendered.

*Example 1:*

Given an element set with a total of 11 integration points and the following integration points output: 2,6,11.

  Label   Default Surface

    2 ->  Not defined

    6 ->  Middle

   11 ->  Outer

*Use Case 1:*

sw inner

show es\_1[sx]

>> Warning message. Default Inner surface is not defined

*Use Case 2:*

sw middle

show es\_1[sy]

>> Middle result for es\_1[sy] displayed

**(3) User Defined Surface Settings**

The user can also override the default surface settings for an element set with a new command called "*swes*" for "switch element set".

Syntax:  swes es\_number [inner | middle | outer] int\_point\_label

*or*

         swes es\_number [inner | middle | outer]

This form of the command does not include an

int\_point\_label and will reset the surface back

to the default setting.

*or*

         swes es\_number - This form of the command will display the

                           current surface settings.

*Examples:* swes 1 inner 2

           >> Defines integration point 2 as the inner surface.

Now the commands sw inner and show es\_1[sx]

will show a result.

           swes 1

           >> Generates the following informational message:

               Element Set 1:

                       Total Points: 11

                       Inner Label:     2

                      Middle Label:   6

                      Outer Label:   11