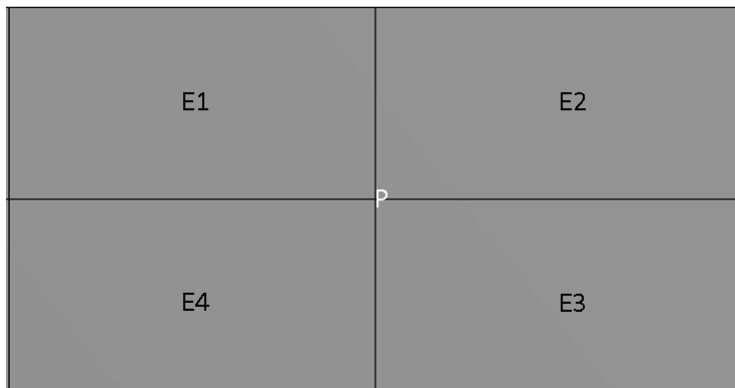


Problem/Description: How are “Unaveraged”, “Averaged”, “Nodal Difference”... results computed in WB Mechanical?

Details of "Equivalent Stress"

Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Equivalent (von-Mises) Stress
By	Time
☐ Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No
Integration Point Results	
Display Option	Elemental Fraction
Results	
☐ Minimum	Averaged
☐ Maximum	Nodal Difference
Minimum Occurs On	Nodal Fraction
Maximum Occurs On	Elemental Difference
Minimum Value Over Time	Elemental Fraction
Maximum Value Over Time	Elemental Mean
☐ Minimum	1.5301
☐ Maximum	1.9963
Information	

Solution:



Node P is shared by element E1, E2, E3 and E4.

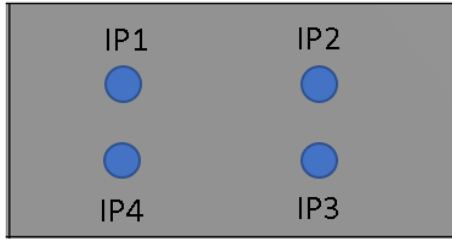
Stress is computed at integration points within element and then is scoped to node via linear interpolation.

Since node P is shared by 4 elements, each element will extrapolate a stress value (let's call them S1, S2, S3 and S4) to node P. With **average** display option, stress displayed at node P is $(S1+S2+S3+S4)/4$.

With **unaveraged** display option, node P has 4 values so stress contour will be discontinuous.

Nodal Difference computes the maximum difference between the unaveraged computed result for all elements that share a particular node. Nodal Difference at P = $\text{Max} (\text{abs}(S1-S2), \text{abs}(S2-S3), \text{abs}(S3-S4), \text{abs}(S4-S1))$

Nodal Fraction = Nodal Difference / Nodal Average



With **elemental mean** option, each element has uniform stress distribution and the stress value is average of stress computed at integration points (IP1, IP2, IP3 and IP4) of the element.



Elemental Difference computes the maximum difference between the unaveraged computed result for all nodes in an element. $\text{Element Difference} = \text{Max} (\text{abs}(N1-N2), \text{abs}(N2-N3), \text{abs}(N3-N4), \text{abs}(N4-N1))$

Elemental Fraction = Elemental Difference / Elemental Mean