PROBLEMS WITH DR.FRAME2D ON THE MACINTOSH

12 November 2012

The current Dr.Frame2D version 4.0b2 running under the OS operating system (Macintosh)
(a) may not recognize an unstable truss and
(b) editing of element properties must be done on individual elements

Figure 1 shows a statically determinate truss correctly analyzed. Element forces are in equilibrium and the displacement shape – scaled up in the figure – is consistent with the computed forces. The truss in fig. 2 - derived from the previous one by deleting an element - is unstable. Dr.Frame2d, however, does not detect the instability and attempts to perform the equilibrium analysis. The results in this case cannot be trusted (they are indeed numerical noise) as clearly shown by the meaningless deformed shape produced in this case. Also, as shown in the following pages, for the unstable configurations, computed reactions are not in equilibrium with the applied loads.

If you are running this version of the program on your laptop you must:
1. Check that the deformed configuration is acceptable. Display the deformed shape and check the numerical results for meaningless – very large – values (see examples in the following pages).
2. Check that the reactions are in equilibrium with the applied loads. They must for the analysis to be correct (see examples in the following pages).

Unrelated to this problem, this same version of the program does not allow editing element properties after selecting the entire truss. Changes must be introduced by selecting one element at a time.

In alternative to the Mac version on your laptop, you can use the Windows version of Dr.Frame2D installed in the Hopeman lab (basement, room 05) and in Harkness 114. This version seems to detect correctly the unstable configurations. Also, if your Mac runs OS 10.6 or earlier versions, you may be able to run the old version 3.0 of Dr.Frame2d. Contact the TAs if this is the case.
Stable & statically determinate

Support Reactions

<table>
<thead>
<tr>
<th>NodeID</th>
<th>R_x (k)</th>
<th>R_y (k)</th>
<th>M_z (k')</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 18</td>
<td>-119.700</td>
<td>85.5000</td>
<td>0.0000</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>119.700</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Joint Displacements

<table>
<thead>
<tr>
<th>ID</th>
<th>U_x (in)</th>
<th>U_y (in)</th>
<th>Theta_z (rad)</th>
</tr>
</thead>
<tbody>
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<td>0.0000e+00</td>
<td>0.0000e+00</td>
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<tr>
<td>&gt; 19</td>
<td>1.981241e-02</td>
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<tr>
<td>&gt; 20</td>
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<td>0.00000e+00</td>
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<tr>
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<tr>
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</tbody>
</table>

Member Results

displacements are very small (order 10^{-2}) and displacement shape is correct.
Support Reactions

<table>
<thead>
<tr>
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<tr>
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<td>0.0000</td>
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Joint Displacements

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<tr>
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<tbody>
<tr>
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<td>0.000000e+00</td>
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<td>0.000000e+00</td>
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<td>-2.450494e-01</td>
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Member Results

<table>
<thead>
<tr>
<th>ID</th>
<th>F_axial(k)</th>
<th>V_x(k)</th>
<th>V_y(k)</th>
<th>M_z(k')</th>
<th>M_y(k')</th>
<th>V_max(k)</th>
<th>V_min(k)</th>
<th>M_max(k')</th>
<th>M_min(k')</th>
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<tbody>
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</tbody>
</table>
unstable

Support Reactions

<table>
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<tr>
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<th>R_x (k)</th>
<th>R_y (k)</th>
<th>M_z (k')</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Joint Displacements

<table>
<thead>
<tr>
<th>ID</th>
<th>U_x (in)</th>
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<th>Theta_x (rad)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 18</td>
<td>0.000000e+00</td>
<td>0.000000e+00</td>
<td>0.000000e+00</td>
</tr>
<tr>
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Member Results

<table>
<thead>
<tr>
<th>ID</th>
<th>F_axial(k)</th>
<th>V_(k)</th>
<th>V_(k')</th>
<th>M_(k')</th>
<th>V_max(k)</th>
<th>loc(ft)</th>
<th>V_min(k)</th>
<th>loc(ft)</th>
<th>M_max(k)</th>
<th>loc(ft)</th>
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<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
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Reactions are not in equilibrium with applied loads.