**title:** Extension of Miles Equation for Ring Baffle Damping Predictions to Small Slosh Amplitudes and Large Baffle Widths.

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### Primary Author (NOTE: will receive all correspondence regarding participation in this program and is assumed to be presenter)

<table>
<thead>
<tr>
<th>Name</th>
<th>U.S. Citizen</th>
<th>Yes No</th>
</tr>
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<tbody>
<tr>
<td>Jeff West</td>
<td></td>
<td></td>
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<tr>
<th>Organization (contractors provide company name): NASA/MSFC</th>
</tr>
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<tbody>
<tr>
<td>Address: Bldg. 4203/Rm 3102</td>
</tr>
<tr>
<td>City: MSFC</td>
</tr>
<tr>
<td>Phone: 256 544-6309</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>ZIP Code: 35812</td>
</tr>
<tr>
<td>Email: <a href="mailto:jeffrey.s.west@nasa.gov">jeffrey.s.west@nasa.gov</a></td>
</tr>
</tbody>
</table>

### 2nd Author  Please provide full contact information for each author.

<table>
<thead>
<tr>
<th>Name</th>
<th>U.S. Citizen</th>
<th>Yes No</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. Q. Yang</td>
<td></td>
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<tr>
<th>Organization (contractors provide company name): CFDRC</th>
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<tr>
<td>Address: Bldg 4203/Rm 3432</td>
</tr>
<tr>
<td>City: MSFC</td>
</tr>
<tr>
<td>Phone: 256 544-8978</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>ZIP Code: 35812</td>
</tr>
<tr>
<td>Email: <a href="mailto:hong.q.yang@nasa.gov">hong.q.yang@nasa.gov</a></td>
</tr>
</tbody>
</table>

### 3rd Author  Please provide full contact information for each author.

<table>
<thead>
<tr>
<th>Name</th>
<th>U.S. Citizen</th>
<th>Yes No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacob Brodnick</td>
<td></td>
<td></td>
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<tr>
<td>Address: Bldg 4203/Rm 3431</td>
</tr>
<tr>
<td>City: MSFC</td>
</tr>
<tr>
<td>Phone: 256 544-7576</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>ZIP Code: 35812</td>
</tr>
<tr>
<td>Email: <a href="mailto:jacob.m.brodnick@nasa.gov">jacob.m.brodnick@nasa.gov</a></td>
</tr>
</tbody>
</table>

### 4th Author  Please provide full contact information for each author.

<table>
<thead>
<tr>
<th>Name</th>
<th>U.S. Citizen</th>
<th>Yes No</th>
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<tbody>
<tr>
<td>Marco Sansone</td>
<td></td>
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<tr>
<td>Address: Bldg 4203/Rm 3430</td>
</tr>
<tr>
<td>City: MSFC</td>
</tr>
<tr>
<td>Phone: 256 544-1583</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>ZIP Code: 35812</td>
</tr>
<tr>
<td>Email: <a href="mailto:marco.d.sansone@nasa.gov">marco.d.sansone@nasa.gov</a></td>
</tr>
</tbody>
</table>

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The Miles equation has long been used to predict slosh damping in liquid propellant tanks due to ring baffles. The original work by Miles identifies defined limits to its range of application. Recent evaluations of the Space Launch System identified that the Core Stage baffle designs resulted in violating the limits of the application of the Miles equation. This paper describes the work conducted by NASA/MSFC to develop methods to predict slosh damping from ring baffles for conditions for which Miles equation is not applicable. For asymptotically small slosh amplitudes or conversely large baffle widths, an asymptotic expression for slosh damping was developed and calibrated using historical experimental sub-scale slosh damping data. For the parameter space that lies between region of applicability of the asymptotic expression and the Miles equation, Computational Fluid Dynamics simulations of slosh damping were used to develop an expression for slosh damping. The combined multi-regime slosh prediction methodology is shown to be smooth at regime boundaries and consistent with both sub-scale experimental slosh damping data and the results of validated Computational Fluid Dynamics predictions of slosh damping due to ring baffles.

Last co-author:
Dogulas Westra, Bldg 4203/Rm 3141 MSFC AL, 35812
douglas.g.westra@nasa.gov

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