The **Packed Bed Reactor Experiment (PBRE)** addresses the hydrodynamics of two-phase flow (gas and liquid) through a packed column in zero-gravity. The gas and liquid flow simultaneously through the interstices of the column packed with 3 mm diameter spheres made of glass or Teflon.

The results from PBRE will be used to formulate design methods for gas-liquid packed bed operations in zero gravity. By making the operations more efficient along with reductions in weight, energy consumption and maintenance time can be achieved. Also, The insight gained from ISS zero-gravity investigation of two-phase flow through packed columns will increase the physical understanding of two-phase flow in general, thus benefitting earth-bound design and manufacturing as well.

**Hardware Components:**

- The experiment will mount in the MSG and includes the following crucial hardware items:
  - Test Module: Consists of a cylindrical column, 2 feet long and 2 inches in diameter, filled with spherical packing 3 mm in diameter plus other supporting components. Two Test Modules will be used, one contains glass spheres (wetting) while the other one contains Teflon spheres (non-wetting).
  - Water Module: a cylinder 1 foot high by 1 foot in diameter, designed to separate the gas and liquid mix exiting the test section.
  - Gas Module, Avionics Module, DACU and Adapter Plate plus cables and hoses maximize the MSG Work Volume.
  - Gas will be supplied from ISS Nitrogen as well as MSG Power and Data.

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**Arrival on ISS**  
SpaceX-8  
September, 2015

<table>
<thead>
<tr>
<th>Accommodation (carrier)</th>
<th>Microgravity Science Glovebox (MSG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upmass (kg) (w/o packing factor)</td>
<td>125 kg</td>
</tr>
<tr>
<td>Volume (m³) (w/o packing factor)</td>
<td>0.150m³</td>
</tr>
<tr>
<td>Power (kw) (peak)</td>
<td>0.75kW</td>
</tr>
<tr>
<td>Crew Time (hrs) (install/uninstall)</td>
<td>14 hours crew time; ~200 autonomous operations time via ground commanding</td>
</tr>
</tbody>
</table>

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**PBRE Set up in the MSG**

**Glass Bead Test Module**

**PBRE Cables and Hoses**