Sloshing of Granular Materials
A Closer Look at the Fluidity of Sand

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Three Phases

Solid

Liquid

Gas

http://www.sailchannelislands.com/images/gallery/sandwaves.jpg

http://www.nightswimming.com/pics/HourGlass.jpg

http://library.thinkquest.org/03oct/01027/sandstormrownrowofhouses.jpg
Segregation

- A binary mixture segregating into bands
Setup
Sloshing Granular Matter
Linear Dependence of Frequency

Amplitude = 5mm, Bead Diameter = 2mm

\[ \phi = 0.270\omega - 0.032 \]
Collapse of Data

-\omega \ln(\Omega) \sqrt{d/g} vs \phi

- Green circle: 2mm, \Omega = 0.18Hz
- Black triangle: 1mm, \Omega = 0.09Hz
- Red triangle: 1mm, \Omega = 0.13Hz
- Green triangle: 1mm, \Omega = 0.18Hz
- Blue triangle: 1mm, \Omega = 0.28Hz
Conclusion

• One measure of the fluidity may be $\eta$.

• As the fluidity increases $\eta$ increases.

• We need to find a theory.

• We need to take more data.