Readme for experimental data for the dynamical impact of solid spheres to viscoelastic surfaces[¶](#gjdgxs)

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Abstract[¶](#1fob9te)

The experimental data of dynamical impacts of a solid spheres to viscoelastic surfaces, which are used as the test data for "Data-driven discovery of self-similarity using neural networks".

All the experiments of data were performed by a author of the manuscript, Hirokazu Maruoka.

Some data includes the work of "[A framework for crossover of scaling law as a self-similar solution: dynamical impact of viscoelastic board](https://link.springer.com/article/10.1140/epje/s10189-023-00292-9)".

Physical parameters are as follows:

* delta(mm) : Maximum deformation $\delta\_m$
* h (mm): a thickness of PDMS board $h$
* phi : a fraction of contact $\phi$
* R(mm) : a radius of sphere $R$
* rho (g/mm^3): density of sphere $\rho$
* E (g/mm/s^2): elastic modulus of PDMS board $E$
* mu (g/mm/s): viscous coefficient of PDMS board $\mu$
* V\_bc(mm/s) : impact velocity $v\_i$

In [9]:

**from** IPython.display **import** Image  
**%matplotlib** inline  
Image(filename**=**'Parameters.png', width**=**800)

Out[9]:

In [11]:

**import** numpy **as** np  
**import** pandas **as** pd  
df **=** pd**.**read\_table("Data\_ExperimentDynVisSurf.txt", sep**=**'\s+')  
pd**.**set\_option('display.max\_columns', 150)  
df

Out[11]:

|  | **delta(mm)** | **h** | **R(mm)** | **rho** | **mu** | **E** | **V\_bc(mm/s)** | **delta\_std** | **V\_bc\_std** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | 6.415434 | 7.67 | 10.0 | 0.0036 | 141.776211 | 77835.17918 | 3121.307528 | 0.057909 | 6.933502 |
| **1** | 5.236563 | 7.67 | 10.0 | 0.0036 | 141.776211 | 77835.17918 | 2232.341081 | 0.083812 | 9.511739 |
| **2** | 4.307466 | 7.67 | 10.0 | 0.0036 | 141.776211 | 77835.17918 | 1527.651911 | 0.046653 | 11.601198 |
| **3** | 3.879024 | 7.67 | 10.0 | 0.0036 | 141.776211 | 77835.17918 | 1358.833244 | 0.061789 | 8.644068 |
| **4** | 3.479800 | 7.67 | 10.0 | 0.0036 | 141.776211 | 77835.17918 | 1042.700467 | 0.044754 | 6.197974 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **122** | 1.816413 | 6.40 | 3.0 | 0.0078 | 127.915370 | 77288.96056 | 918.982336 | 0.024563 | 3.034792 |
| **123** | 1.693548 | 6.40 | 3.0 | 0.0078 | 127.915370 | 77288.96056 | 738.109464 | 0.034215 | 0.785905 |
| **124** | 1.536194 | 6.40 | 3.0 | 0.0078 | 127.915370 | 77288.96056 | 611.867387 | 0.056221 | 2.778492 |
| **125** | 1.332099 | 6.40 | 3.0 | 0.0078 | 127.915370 | 77288.96056 | 509.566338 | 0.083132 | 3.479910 |
| **126** | 1.050094 | 6.40 | 3.0 | 0.0078 | 127.915370 | 77288.96056 | 371.439538 | 0.021586 | 1.650700 |

127 rows × 9 columns