

Impeller Power Draw in Liquid-Solid Suspensions

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Objective/ Motivation

- Previous studies of impeller power draw in liquid-solid suspensions report limited data or conflicting results
- This work provides experimental evidence of the effect of suspension density, impeller type, and solid characteristics

Experimental Method

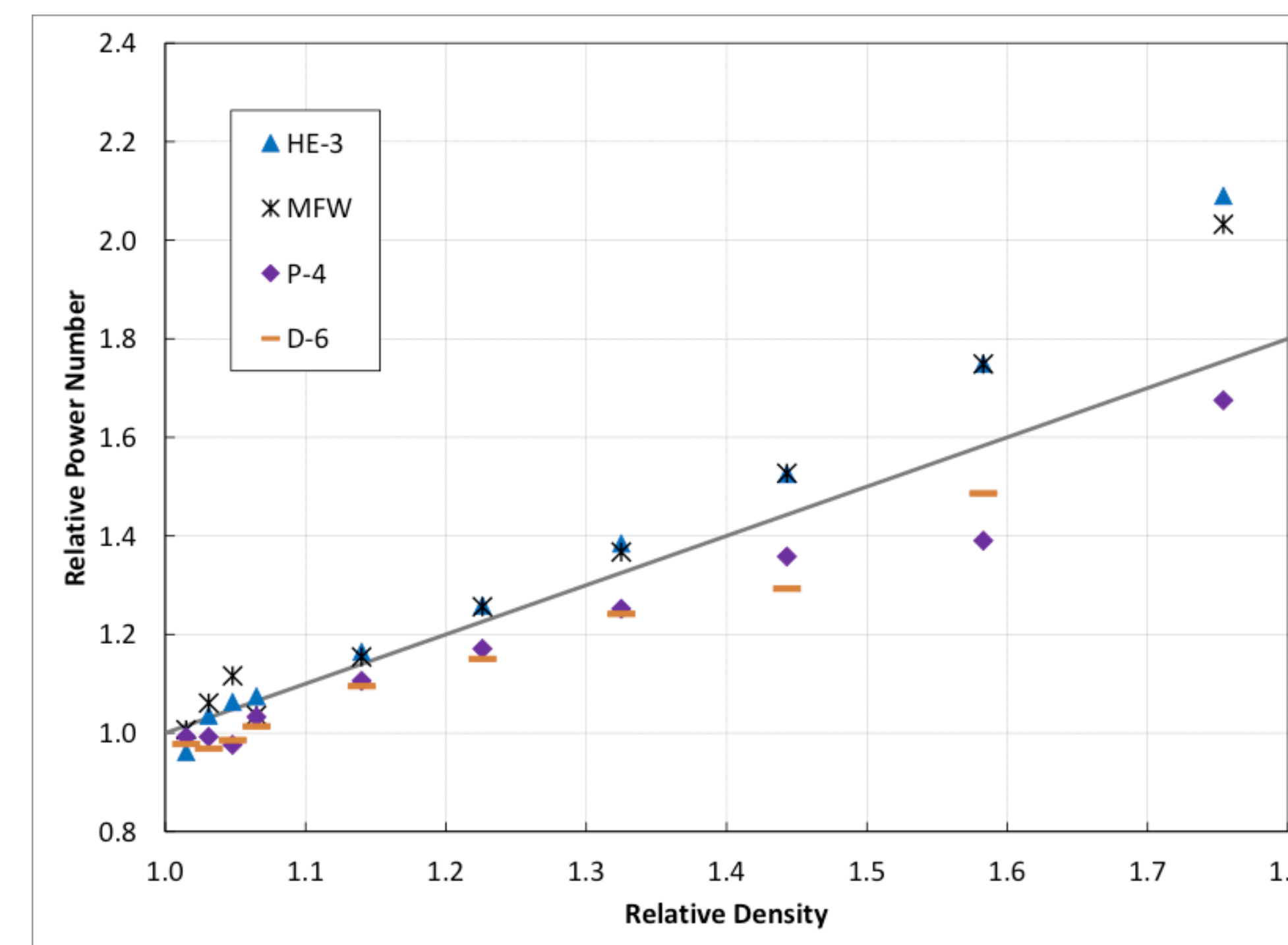
- Turbulent impeller power numbers were measured in liquid-only operation and in solid-liquid suspensions.
- 6 different impellers tested
- Solids, like sand, used to change solid-liquid suspension density
- Neutrally buoyant large acrylic and fine acrylic solids tested

Conclusions

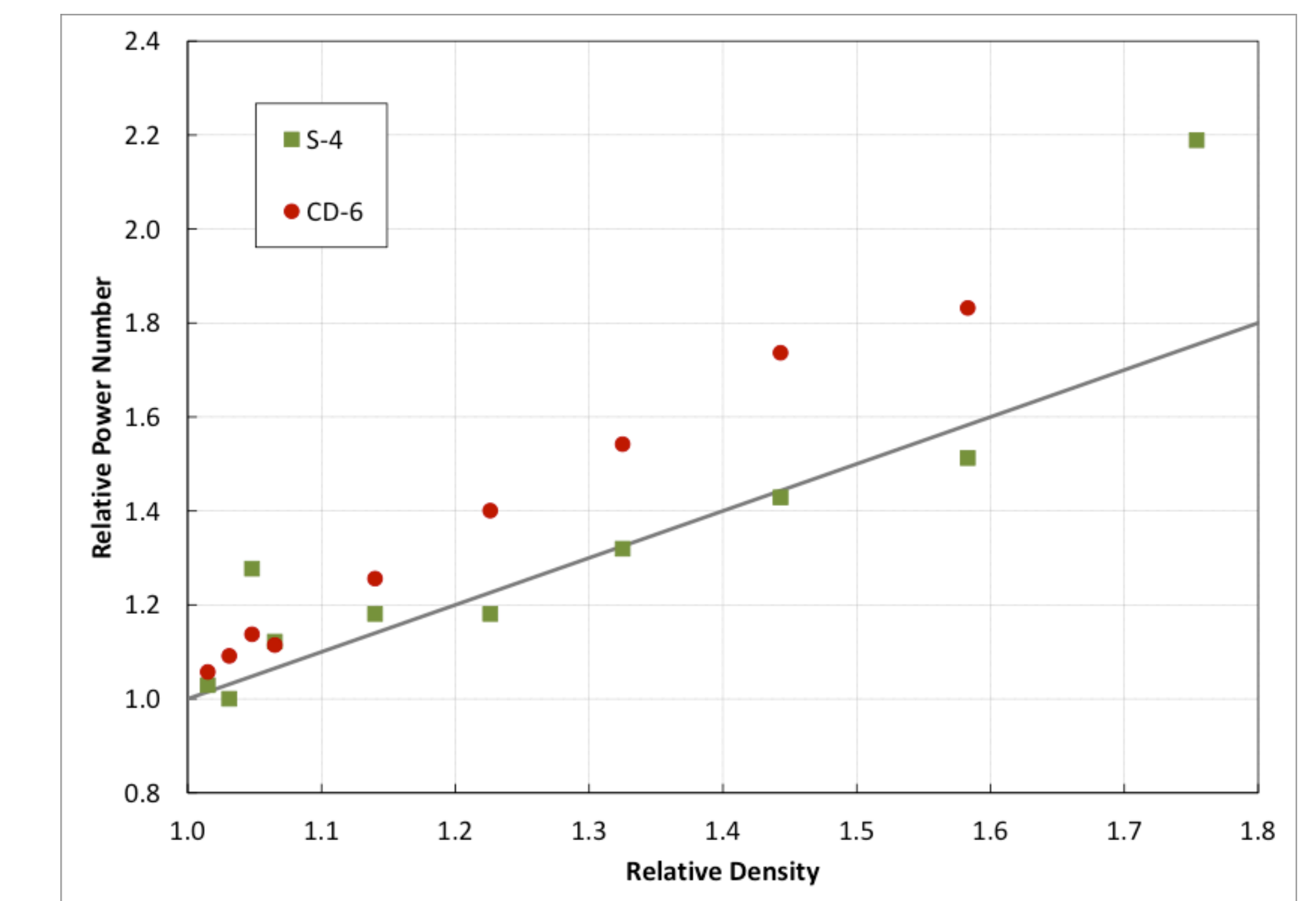
- Different impellers behave differently
- For suspension densities less and 30% of liquid density, power number increased proportionally

Results

- Power number of all impellers increased as relative density increased

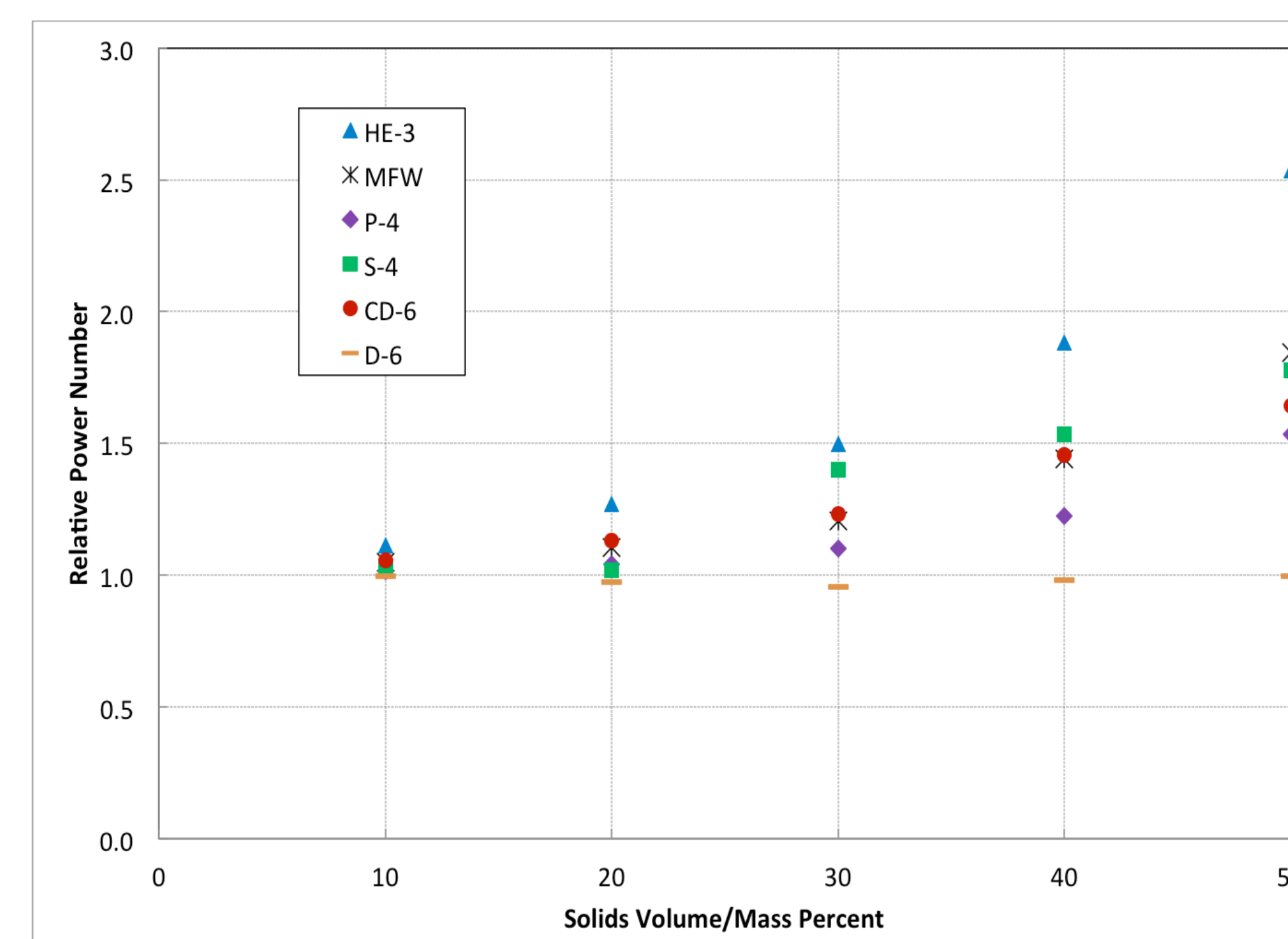


Effect of suspension density on power number of HE-3, Maxflo W, P-4 and D-6 impeller



Effect of suspension density on power numbers of S-4 and CD-6 impellers

- Acrylic particles increased the power number as mass percent increased



Effect of mass percent of 3000 micron acrylic suspension for all impellers

Impeller	Fine acrylic Power Number	Large acrylic Power Number
HE-3	1.09	1.50
Maxflo W	1.05	1.21
P-4	0.93	1.10
S-4	1.23	1.40
CD-6	1.03	1.23
D-6	0.92	0.96

Comparison of 180 micron acrylic and 3000 micron acrylic at 30 mass %

- Some impellers greatly affected by neutrally buoyant particles, others not at all
- Generally, smaller particles have less affect on power number