

## Appendix I

### Comparison of experimental conditions in relevant studies

	Particle diameters (mm)	Volumne (mm cubed)	Mass (kg)	$\psi_{CRf}$	$\Delta$	System-to-grain size ratio <sup>□</sup>	$N^{Sa}$
<b>Goujon et al. (2007)</b>	0.132, 0.225, 0.275, 0.325	*	0.176	variable	2.5	**	***
<b>Moro et al. (2010)</b>	0.15, 0.20, 1.00	*	10	0.25	6.7	**	***
<b>Yang et al. (2015)</b>	0.1-0.3, 0.42-2.00, 4.75-9.503	$1.15 \times 10^6$	3	variable	35.6	$3.3 \times 10^4$	***
<b>Bartali et al. (2020)</b>	3.0, 1.5, 0.375	*	4	<0.07	4.0-21.3	**	***
<b>Hu et al. (2020)</b>	1.0-4.0, 4.0-8.0, 8.0-12.0, 12.0-16.0	*	10	0.3	5.6	**	***
<b>Li et al. (2021)</b>	0.175, 1.5	$2.00 \times 10^7$ - $8.00 \times 10^7$	*	*	8.6	$4.8 \times 10^7$ - $1.9 \times 10^8$	$1.0 \times 10^{-3}$ - $1.0 \times 10^{-1}$
<b>Duan (2022)</b>	<0.075, 0.075-0.5	$1.80 \times 10^6$	*	0.05	7.7	$4.4 \times 10^8$ - $3.0 \times 10^9$	***
<b>This study</b>	0.355-0.500, 0.5-1.0, 9.5-16.0, 16.0-22.4	$1.33 \times 10^7$ - $20.00 \times 10^7$	20-30	0.05-0.15	17.0-44.9	$5.0 \times 10^4$ - $6.9 \times 10^4$	$1.5 \times 10^{-2}$ - $1.7 \times 10^{-1}$

\* not reported

\*\* could not be calculated because the volume is not reported

\*\*\* not calculated because required data was not available

□ at  $\psi=0.5$

◊ for experimental series A