Table 1 Shear wave velocities for FCC samples calculated using particle scale and boundary data *(values in italics and parentheses give error relative to direct measurement of wave passage (dL/dt))*

Packing	S_q (μm)	σ' (MPa)	e	$C_{N,\,mean}$	$V_{S,dL/dt}$ (m/s)	$V_{S,P\text{-}P}$ (m/s)	
FCC	0	0.1	0.353	12.0	544.5	542.2	*(-0.4%)*
FCC	0	0.2	0.352	12.0	612.2	609.7	*(-0.4%)*
FCC	0	0.3	0.352	12.0	655.8	652.4	*(-0.5%)*
FCC	0	0.5	0.352	12.0	715	710.0	*(-0.7%)*
FCC	0	1	0.351	12.0	803.6	795.8	*(-1.0%)*
FCC	0	10	0.341	12.0	1174.5	1166.6	*(-0.7%)*
FCC	0.5	0.1	0.352	12.0	431.6	431.4	*(0.0%)*
FCC	0.5	0.2	0.351	12.0	534.8	532.8	*(-0.4%)*
FCC	0.5	0.3	0.351	12.0	604.2	602.0	*(-0.4%)*
FCC	0.5	0.5	0.350	12.0	664.8	661.3	*(-0.5%)*
FCC	0.5	1	0.349	12.0	756.1	750.2	*(-0.8%)*
FCC	0.5	10	0.339	12.0	1151.8	1144.4	*(-0.6%)*
FCC	1	0.1	0.351	12.0	372.6	373.3	*(0.2%)*
FCC	1	0.2	0.351	12.0	461.4	460.8	*(-0.1%)*
FCC	1	0.3	0.350	12.0	523	521.3	*(-0.3%)*
FCC	1	0.5	0.349	12.0	613.1	611.2	*(-0.3%)*
FCC	1	1	0.348	12.0	742.5	736.7	*(-0.8%)*
FCC	1	10	0.337	12.0	1130.2	1123.6	*(-0.6%)*

Table 2 Shear wave velocities for random samples calculated using particle scale and boundary data *(values in italics and parentheses give error relative to direct measurement of wave passage (dL/dt))*

Packing	S_q (μm)	σ' (MPa)	e	$C_{N,\,mean}$	$V_{S,dL/dt}$ (m/s)	$V_{S,P\text{-}P}$ (m/s)	
RDP	0	0.1	0.544	6.02	365.1	368.4	*(0.9%)*
RDP	0	0.2	0.543	6.07	411.4	414.7	*(0.8%)*
RDP	0	0.3	0.543	6.10	441.8	444.7	*(0.7%)*
RDP	0	0.5	0.542	6.15	483.1	485.9	*(0.6%)*
RDP	0	1	0.540	6.24	546.1	548.6	*(0.5%)*
RDP	0	10	0.519	6.69	831	830.9	*(0.0%)*
RDP	0.5	0.1	0.544	6.13	323.5	326.5	*(0.9%)*
RDP	0.5	0.2	0.543	6.16	381.5	384.4	*(0.8%)*
RDP	0.5	0.3	0.543	6.19	414.4	416.8	*(0.6%)*
RDP	0.5	0.5	0.542	6.23	457.3	459.7	*(0.5%)*
RDP	0.5	1	0.539	6.30	523.4	524.7	*(0.3%)*
RDP	0.5	10	0.518	6.70	826.8	825.3	*(-0.2%)*
RDP	1	0.1	0.541	6.16	281.9	283.9	*(0.7%)*
RDP	1	0.2	0.540	6.20	348.6	351.3	*(0.8%)*
RDP	1	0.3	0.539	6.22	393.2	394.6	*(0.4%)*
RDP	1	0.5	0.538	6.25	444.8	446.2	*(0.3%)*
RDP	1	1	0.536	6.31	513.5	513.6	*(0.0%)*
RDP	1	10	0.514	6.72	812.9	811.2	*(-0.2%)*
RLP	0	0.1	0.646	5.03	300.7	305.8	*(1.7%)*
RLP	0	0.2	0.645	5.12	342.9	348.8	*(1.7%)*
RLP	0	0.3	0.644	5.17	371.1	376.8	*(1.5%)*
RLP	0	0.5	0.643	5.25	409.8	415.8	*(1.5%)*
RLP	0	1	0.640	5.36	469.5	475.8	*(1.3%)*
RLP	0	10	0.613	5.91	748.6	752.3	*(0.5%)*
RLP	0.5	0.1	0.646	5.21	265.5	272.2	*(2.5%)*
RLP	0.5	0.2	0.645	5.28	315.2	322.0	*(2.2%)*
RLP	0.5	0.3	0.644	5.33	345.5	352.6	*(2.0%)*
RLP	0.5	0.5	0.642	5.40	387	394.1	*(1.8%)*
RLP	0.5	1	0.639	5.50	450.6	457.6	*(1.6%)*
RLP	0.5	10	0.611	5.98	747	751.6	*(0.6%)*
RLP	1	0.1	0.643	5.28	237.1	244.1	*(3.0%)*
RLP	1	0.2	0.641	5.34	294.4	302.0	*(2.6%)*
RLP	1	0.3	0.640	5.38	330.2	337.5	*(2.2%)*
RLP	1	0.5	0.638	5.44	375.7	382.6	*(1.8%)*
RLP	1	1	0.635	5.54	442.1	447.4	*(1.2%)*
RLP	1	10	0.607	6.01	734.7	738.9	*(0.6%)*