

Description of data for paper titled
The influence of packing structure and interparticle forces on ultrasound transmission in granular media

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Supplementary Data:

Data used to produce the results in the paper with the noted title are provided in the supplementary files to be opened and viewed in MATLAB[®]. The supplementary files contain the following: **Cens.mat** for locations of particle centers, **Stress.mat** for Volume-averaged grain stress components, **ParticleVols.mat** for particle volumes, **ForceLists.mat** for inter-particle forces, **WaveSignals.mat** for ultrasound input and measured signals through the sample, and **PisWaveSignals.mat** for ultrasound input and measured signals between the top and bottom platens in contact.

Cens.mat includes arrays **CenX**, **CenY** and **CenZ**: Particles mass centers, as determined from XRCT data for load steps 1–11 analyzed in the paper. Array dimensions are 621 x 11, with rows corresponding to grains and columns to load steps. For a fractured particle, the provided center position is the average mass center of all fragments. Units are mm.

Stress.mat includes arrays **StressXX**, **StressYY**, **StressZZ**, **StressXY**, **StressXZ** and **StressYZ**: Volume-averaged grain stress components, computed from volume-averaged grain strains determined using 3DXRD, as described in section 1B, for load steps 1–11 analyzed in the paper. Array dimensions are 621 × 11, with rows corresponding to grains and columns to load steps. For a fractured particle, the provided stress components, when available, are assumed to be values for the fragment with the largest volume. Units are MPa.

ParticleVols.mat: Volume of grains, as determined from XRCT images. For a fractured particle, the provided volume is the overall volume over all fragments. Units are mm³.

ForceLists.mat: **ForceList**, a list containing force and contact networks for load steps 2-11 (lists 1 – 10 in sequential order). Each list is an $N_c \times 12$ array, where N_c is the number of all contacts including particle-particle and particle-boundary contacts. Rows corresponds to contacts and columns to the following quantities: column 1 (normal force at contact, units are N); columns 2-3 (grain numbers, consistent with row numbers in other arrays, with 9997 representing the bottom boundary, 9998 the top boundary, and 9999 the side boundaries); columns 4-6 (centroid of contact plane, units are m); columns 7-9 (normal vector of contact plane); columns 10-12 (one vector parallel to contact plane).

WaveSignals.mat: Arrays in lists **Input04**, **Output04**, **Input08**, **Output08**, **Input12**, **Output12**, **Input16**, and **Output16**, corresponding to the input and output signals of Gaussian bursts, applied during sample compression, centered at 0.4 MHz, 0.8 MHz, 1.2 MHz and 1.6 MHz, respectively. Each list contains 10 arrays corresponding to signals for load steps 2-11 (in sequential order). Array dimensions are 25000 × 5, with rows corresponding to time and columns to repeated measurements. The sampling rate of signals is 60 MHz. Signal amplitude unit is V.

PisWaveSignals.mat: Arrays **PisInput04**, **PisOutput04**, **PisInput08**, **PisOutput08**, **PisInput12**, **PisOutput12**, **PisInput16**, and **PisOutput16**, corresponding to the input and output signals of Gaussian bursts, applied during sample compression, centered at 0.4 MHz, 0.8 MHz, 1.2 MHz and 1.6 MHz. Array dimensions are 25000 × 5, with rows corresponding to time and columns to repeated measurements. The sampling rate of signals is 60 MHz. Signal amplitude unit is V.