

Supplementary Information for: Human interaction with viscoelastic matter

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Table S1: Distance thresholds, number of clusters, and silhouette scores for clustering dendrograms shown in Figures 6 – 10.

		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Task 1a	Threshold	17.97	35.95	53.92	71.89	89.86	107.8	125.8
	Clusters	88	24	12	7	4	3	3
	Score	0.014	0.029	0.048	0.083	0.495	0.504	0.594
Task 1b	Threshold	19.40	38.80	58.20	77.60	97.00	116.4	135.8
	Clusters	79	20	11	6	3	3	3
	Score	0.027	0.038	0.066	0.073	0.525	0.525	0.525
Task 2a	Threshold	18.68	37.35	56.03	74.71	93.38	112.1	130.7
	Clusters	84	18	11	7	4	3	3
	Score	0.018	0.039	0.052	0.238	0.505	0.504	0.504
Task 2b	Threshold	20.95	41.90	62.84	83.79	104.7	125.7	146.6
	Clusters	59	15	8	6	4	3	2
	Score	0.026	0.034	0.054	0.155	0.528	0.521	0.732
Task 3	Threshold	17.82	35.65	53.47	71.30	89.12	107.0	124.8
	Clusters	84	22	10	8	5	4	3
	Score	0.019	0.041	0.064	0.252	0.302	0.321	0.561

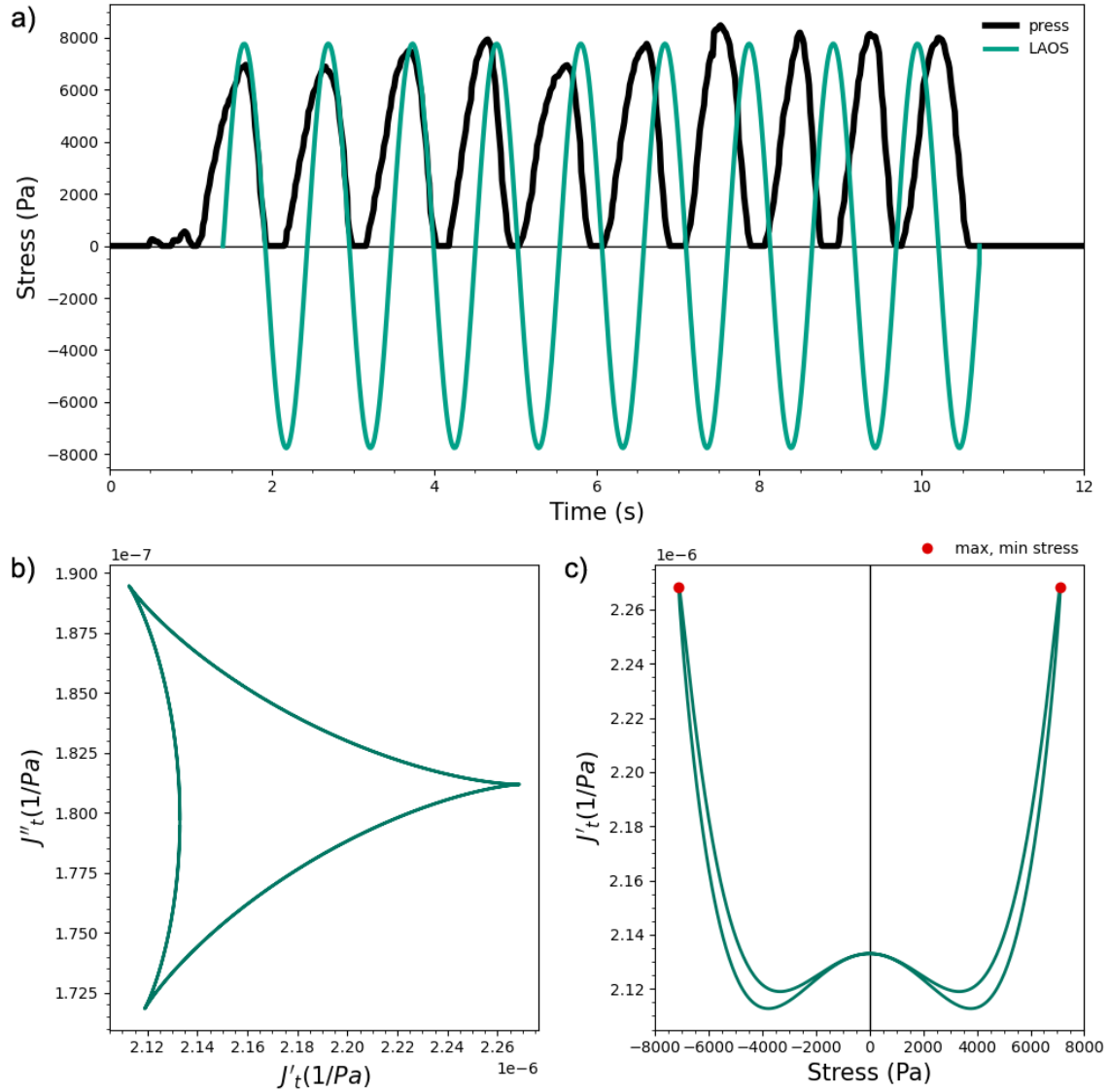


Figure S1. Example of coarse graining a pressing profile to an oscillatory stress wave. a) pressing profile for participant 85, task 1a, sample 5, right side plotted with a sinusoidal stress wave matching the median peak force (7,764 Pa) and median angular frequency (6.064 rad/s) of pressing. Instantaneous dynamic compliances b) and c) J'_t versus stress for sample 5 subjected to an input sinusoidal stress of 7,130 Pa and 10 rad/s. $J'_{t,max}$ and $J'_{t,min}$, the dynamic storage compliance at maximum and minimum stress, are shown as red points in c).

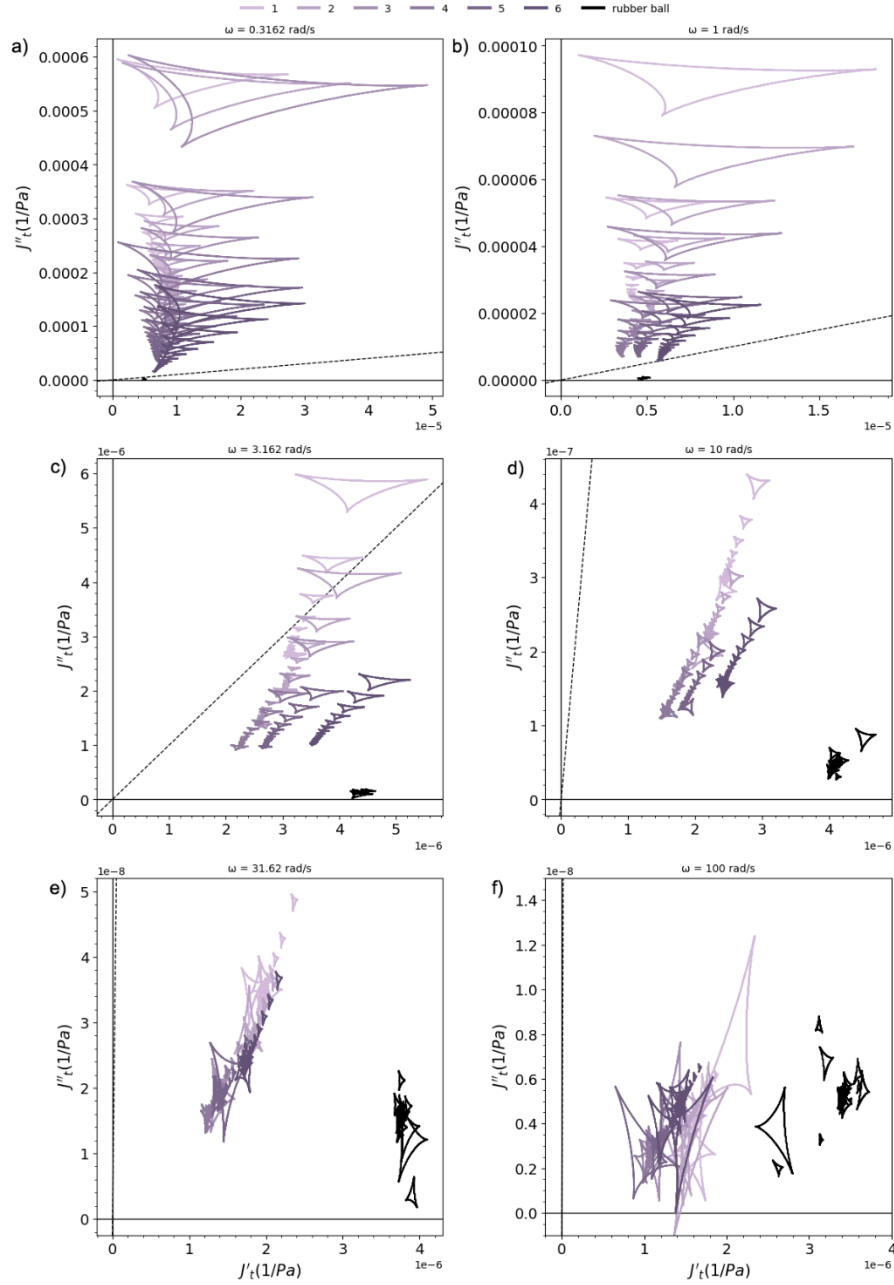


Figure S2. Instantaneous dynamic compliances for all samples from a LAOS stress experiment from 10 – 13,000 Pa stress amplitude. Individual stress sweeps are shown at constant angular frequencies of a) 0.3162, b) 1, c) 3.162, d) 10, e) 31.62, and f) 100 rad/s. Viscoelastic samples show predominantly viscous behavior in a) and b) at $\omega \leq 1$ rad/s (above 45° dashed line), with a transition to primarily elastic behavior in d) – f) at $\omega \geq 10$ rad/s (below 45° dashed line). Rubber sample exhibits predominantly elastic

behavior at all stresses and frequencies shown here. Deltoids move downward with increasing stress amplitude for each sample and frequency.

Stimulus 1 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

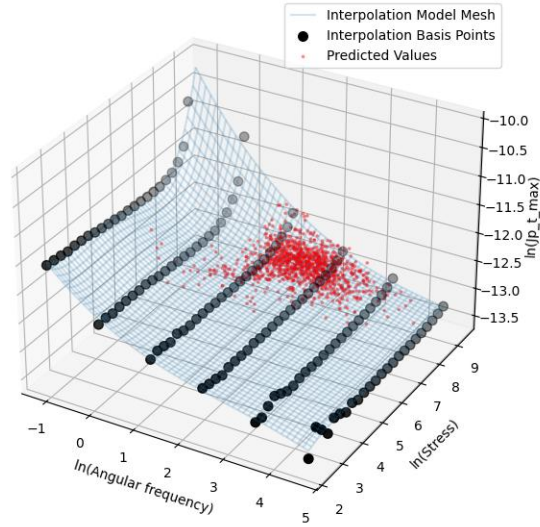


Figure S3. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 1 linearized by taking the natural log of all parameters. Measured values are shown as black and gray circles, the interpolation model mesh is shown in blue, and interpolated values based on the median stress and frequency for each participant are shown as red dots.

Stimulus 2 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

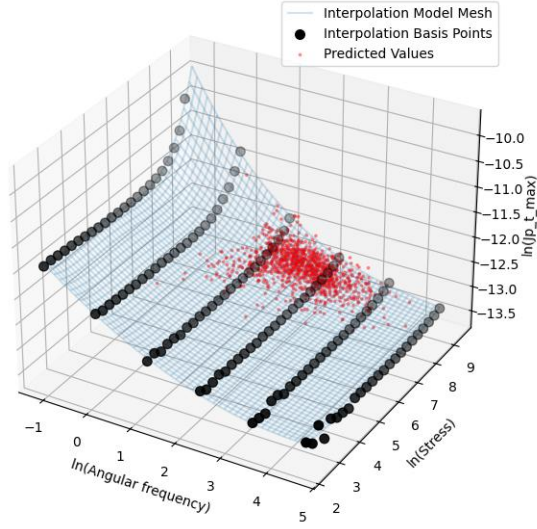


Figure S4. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 2.

Stimulus 3 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

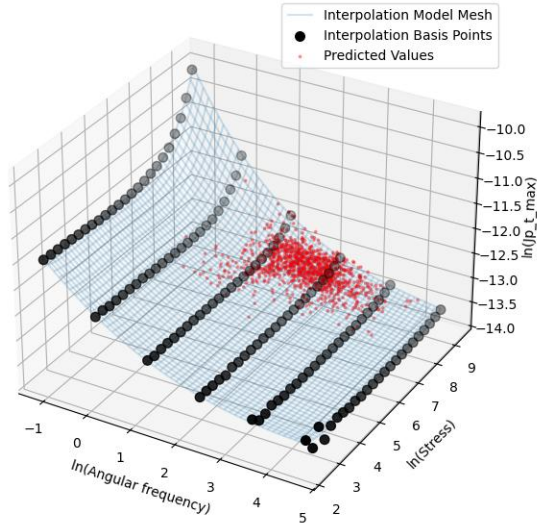


Figure S5. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 3.

Stimulus 4 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

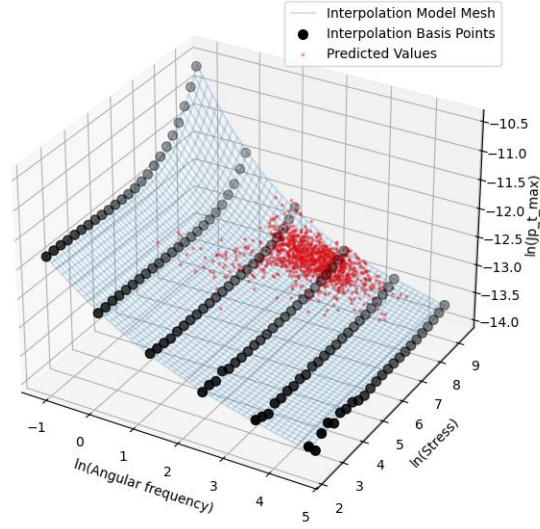


Figure S6. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 4.

Stimulus 5 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

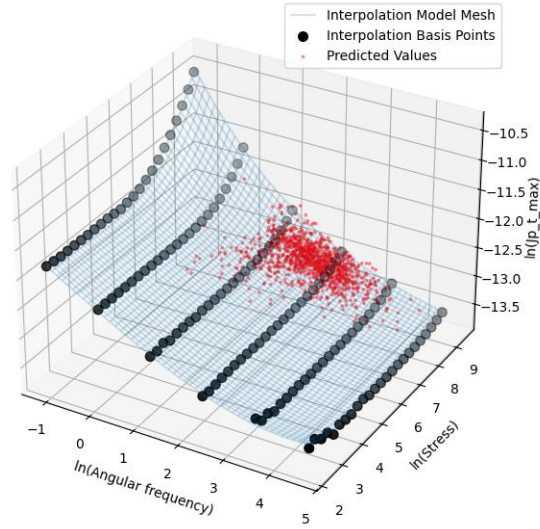


Figure S7. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 5.

Stimulus 6 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

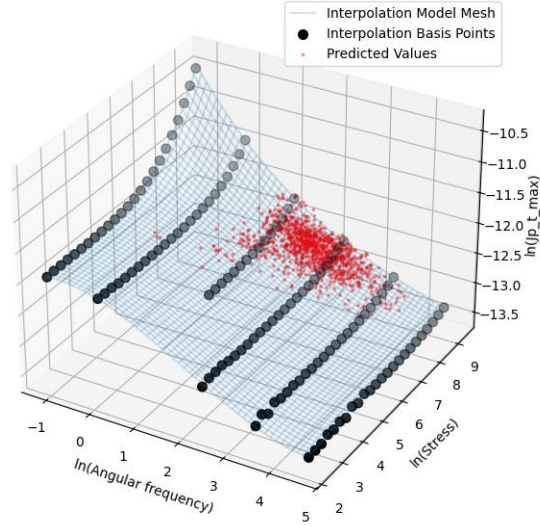


Figure S8. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for sample 6.

Stimulus 7 Interpolated Surface for $\ln(J_{p_t_max})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

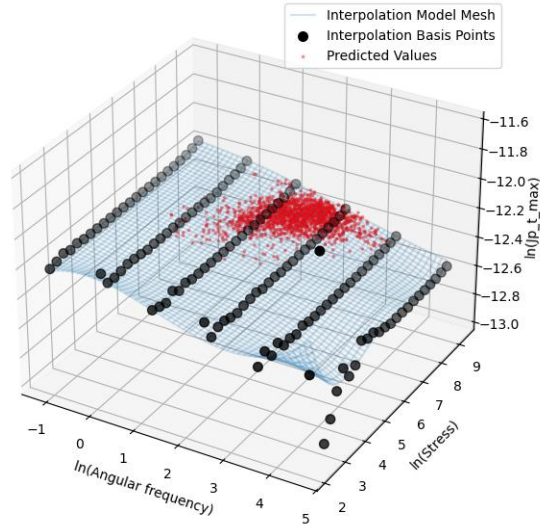


Figure S9. Measured and interpolated dynamic compliance for large stress $J'_{t,max}$ for the rubber ball.

Stimulus 1 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

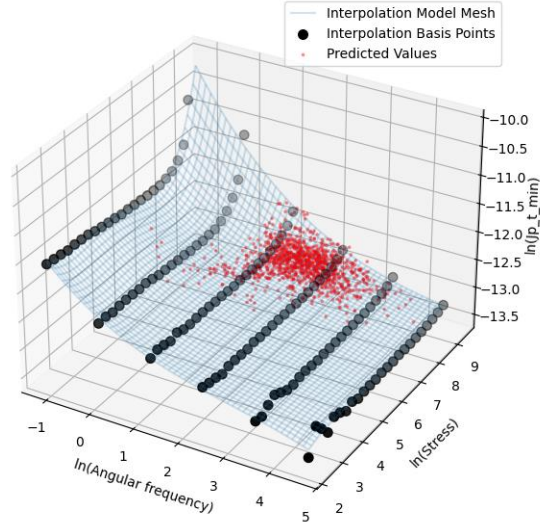


Figure S10. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 1.

Stimulus 2 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

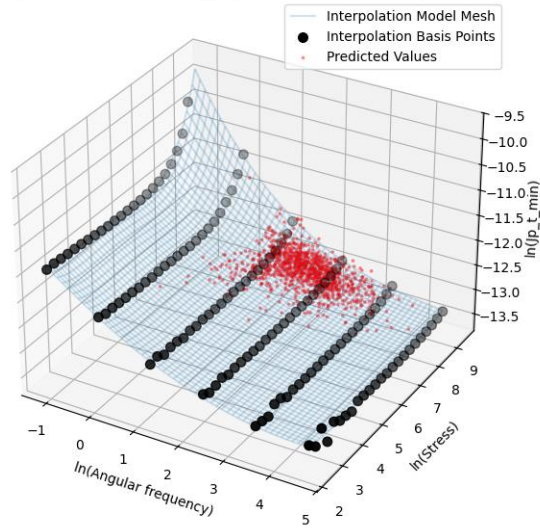


Figure S11. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 2.

Stimulus 3 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

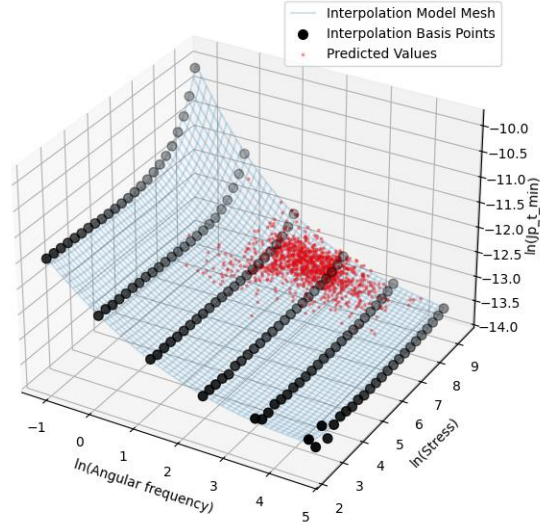


Figure S12. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 3.

Stimulus 4 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

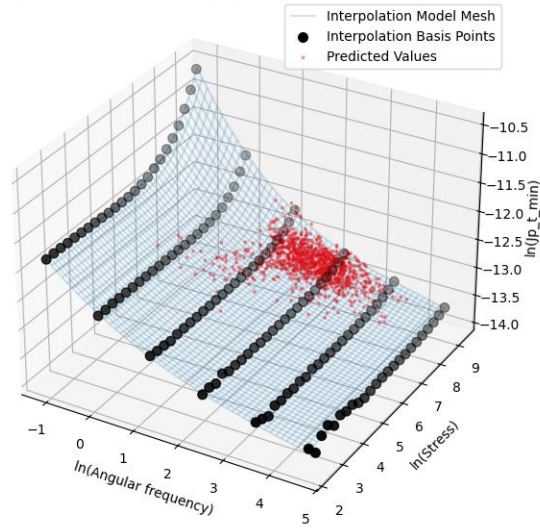


Figure S13. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 4.

Stimulus 5 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

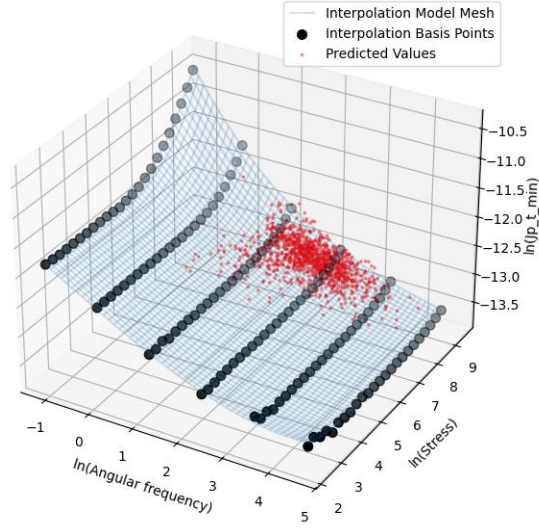


Figure S14. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 5.

Stimulus 6 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

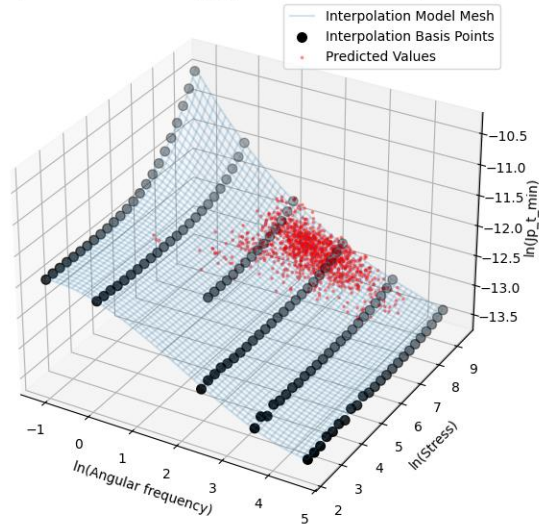


Figure S15. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for sample 6.

Stimulus 7 Interpolated Surface for $\ln(J_{p_t_min})$ vs. $\ln(\text{Angular frequency})$ and $\ln(\text{Stress})$

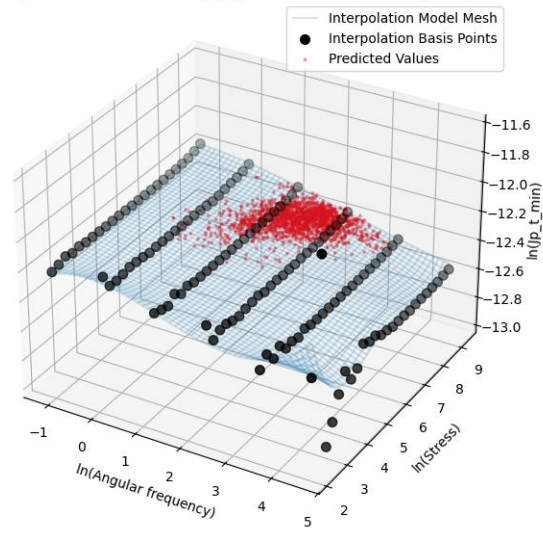


Figure S16. Measured and interpolated dynamic compliance for minimum stress $J'_{t,min}$ for the rubber ball.