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supplemental material

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1. Results

We show the parameters that we use at the time of physical simulation in table 1. In the simulation, we utilize literature values [Fuj69, oJE15] in terms of shear modulus E, Poisson ratio ν and density par unit area σ. The execution environment when simulating is CPU: Intel(R) core(TM) i7 CPU 2.93GHz, GPU: NVIDIA GeForce GT 220, RAM: 4GB and OS: Windows 7. Also, the time step t of the physical simulation is 1/44100 [s], the refresh rate of animations is 60 [fps] and the audio sampling rate of sounds by friction is 44100 [Hz].

1.1. Examples

cloth: In our results, we synthesize the sounds by friction in the case of pulling a cloth (cotton) over the sphere (see Fig. 1 and Fig. 2). We change the velocity of a cloth in cloth1 and cloth2. Then, our method is able to generate plausible sounds matched to its speed each of case. To see the figures, there are differences between cloth1 and 2 in waveforms. These results show that (i) friction phenomena lead to various consequences every time and (ii) results are not stretched the waveform conforming with the velocity.

metal: In this result, we generate the friction sounds of metal (cooper) sliding on the floor (see Fig. 3). As a result, we succeed to create a sound like metal by friction, and its sound give us completely different impression from the results of cloth ones.

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References

[Fuj69] FUJIMOTO S.: Seni bussei tosite no gouseiritu ni tuite (modulus of rigidity as fiber properties). *Textile Engineering 22*, 5 (1969), 369–376. URL: http://ci.nii.ac.jp/naid/130004047298/, doi:10.4188/transjtmsj1965a.22.P369. 1

[oJE15] OF JAPAN) .ED K. T. N. A. O. (Ed.): *Rika Nenpyou (chronological science tables) Heisei 28 Nen (2016 A.D.)*. Maruzen, 2015. 1

Table 1: *List of conditions at the time of the physical simulation*

	Shear modulus E [GPa]	Poison rate ν	Density ρ [kg/m^2]	a, b [m]	Dispersion σ^2	Vertex	Time [min]
cloth1	928.7	0.85	1.54×10^1	5.0×10^{-4}	1.0×10^{-12}	900	31
cloth2	928.7	0.85	1.54×10^1	5.0×10^{-4}	1.0×10^{-12}	900	59
cooper	129.8	0.343	8.94	1.0×10^{-8}	1.0×10^{-7}	242	72

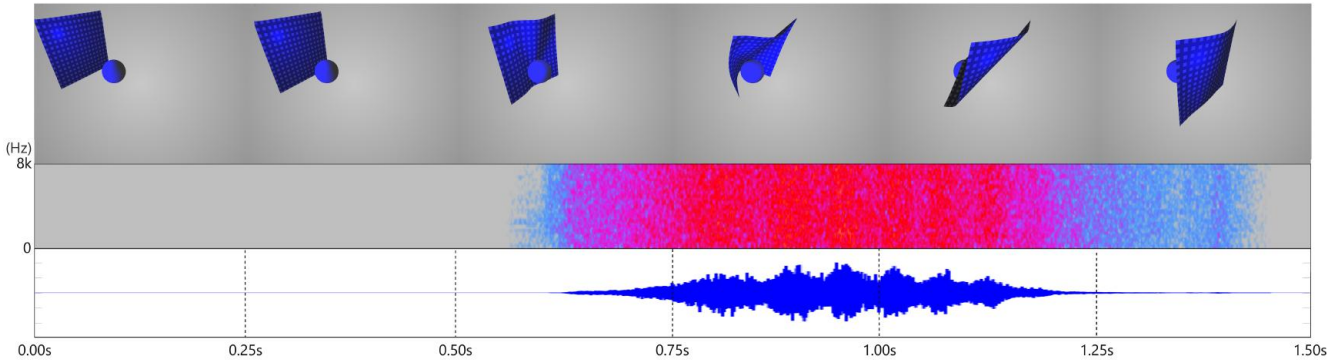

Figure 1: *Key frames and sound waveform of a cloth (cotton). In this example, pull a cloth toward the front and slide it over the sphere.*

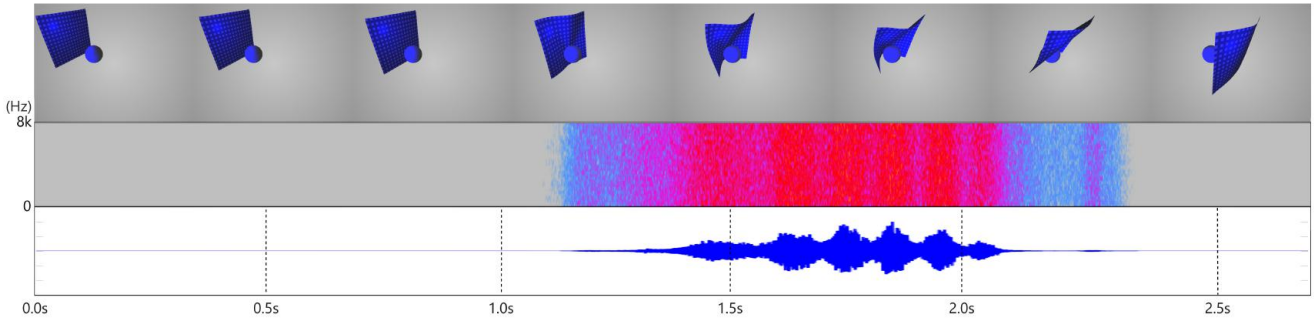

Figure 2: *Key frames and sound waveform of a cloth (cotton). In this example, change the velocity of pulling a cloth ($\times$ 1/2).*

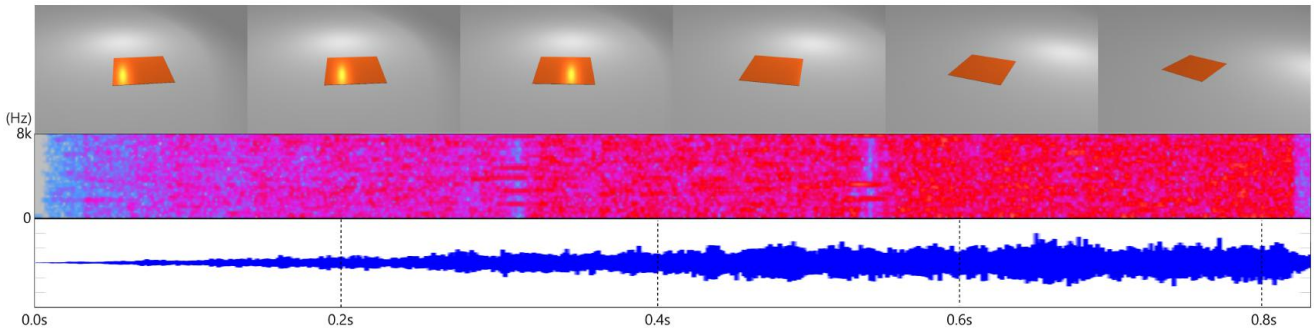

Figure 3: *Key frames and sound waveform of a metal (copper). In this example, slide a copper on the floor.*