

Wave Propagation on Surfaces

The wave equation $f_{tt} = a\Delta f - bf$, like the diffusion equation, describes how a function f changes over time by a scalar coefficient a times its spatial laplacian. Here $1 / \sqrt{a}$ is the speed of the wave and b is a dampening factor. f itself could represent a color or height field prescribed at the mesh vertices. A discretization of the wave equation with implicit time stepping is provided in [1]

$$((1 + bh) - ah^2\Delta) f(t) = (2 - bh) f(t-h) - f(t - 2h)$$

where f is evaluated based on its value at the previous two time steps for some duration $h > 0$

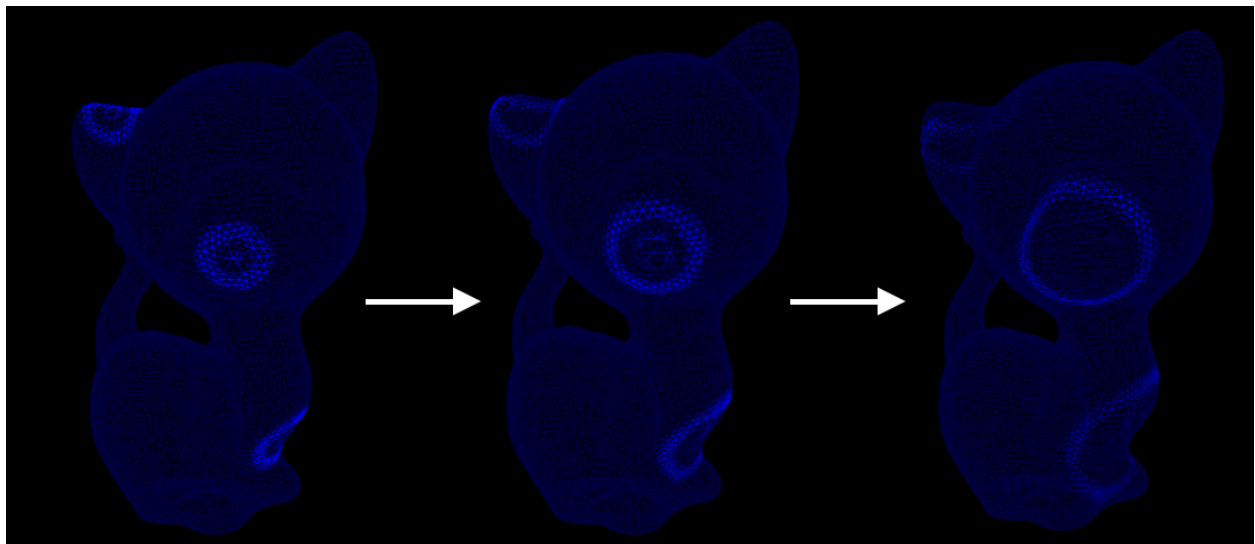


Figure 1: Three independent wave sources seen to propagate on the kitten over time

Implementation: <https://github.com/rohan-sawhney/wave-mesh>

[1] M. Kazhdan. Fast and Exact (Poisson) Solvers on Symmetric Geometries