

## Wave Propagation on Surfaces

The wave equation  $f_{tt} = a\Delta f - bf_t$ , like the diffusion equation, describes how a function  $f$  changes over time by a scalar coefficient  $a$  times its spatial laplacian. Here  $1 / \text{sqrt}(a)$  is the speed of the wave and  $b$  is a dampening factor.  $f$  itself could represent a color 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  $h > 0$ .

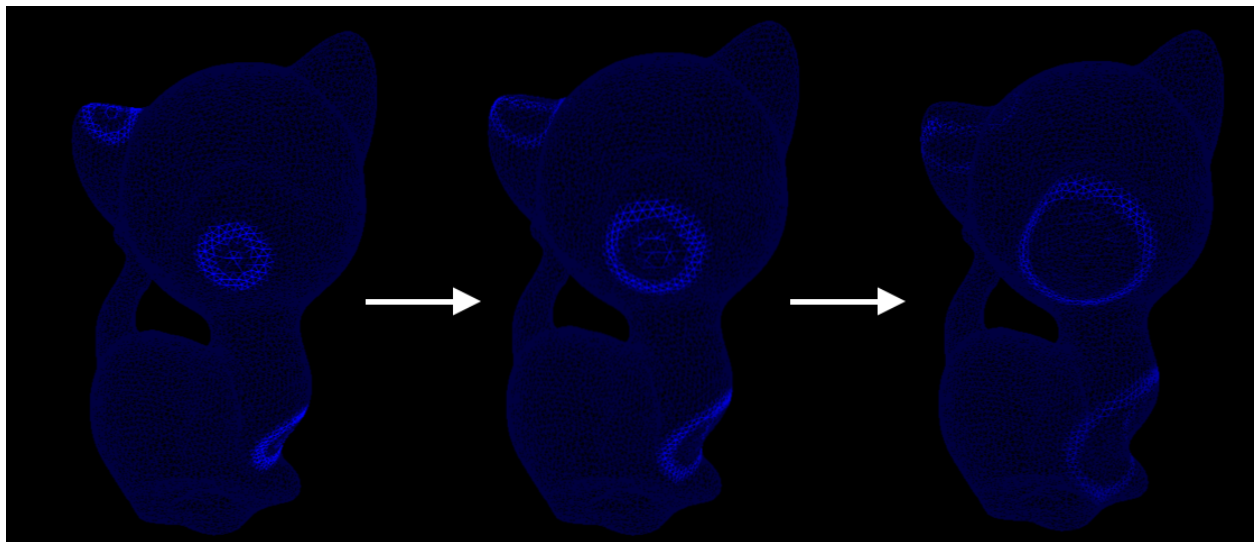


Figure 1: Three independent wave sources seen to propagate on the kitten over time

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

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