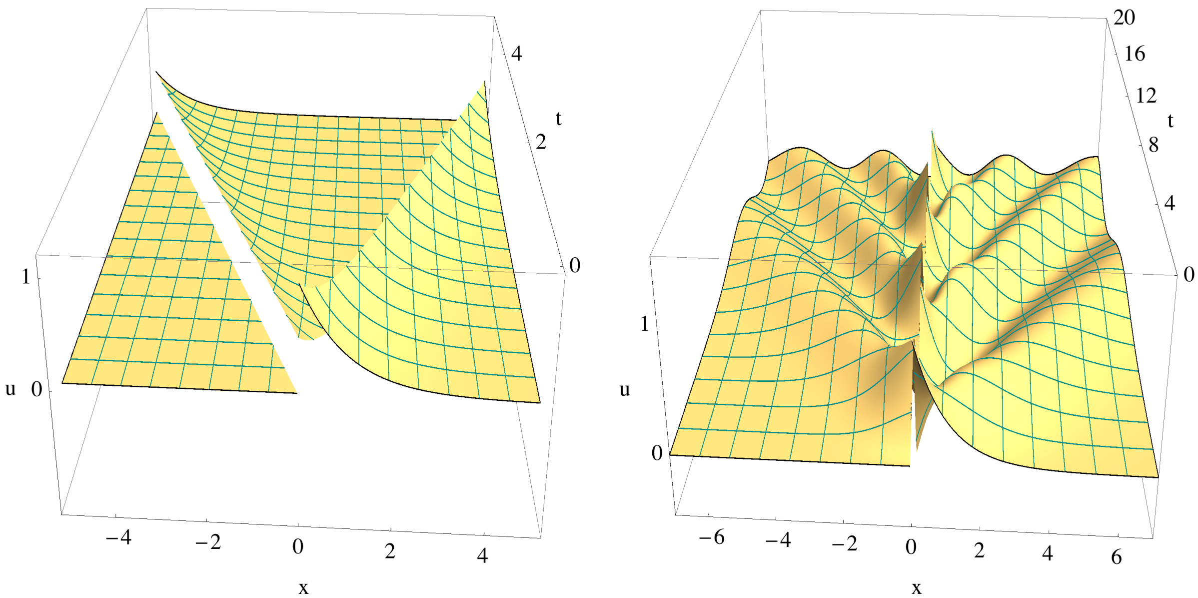

Figure 1: Discontinuity propagation on $\mathbb{R}$. Evolution of the classical (left) and nonlocal (right) wave equation solutions with discontinuous initial displacement. In the classical case, discontinuities propagate along characteristic curves of the equation, which is unphysical. However, in the nonlocal case, discontinuities remain stationary, which is physical. Classical and nonlocal theories disagree.

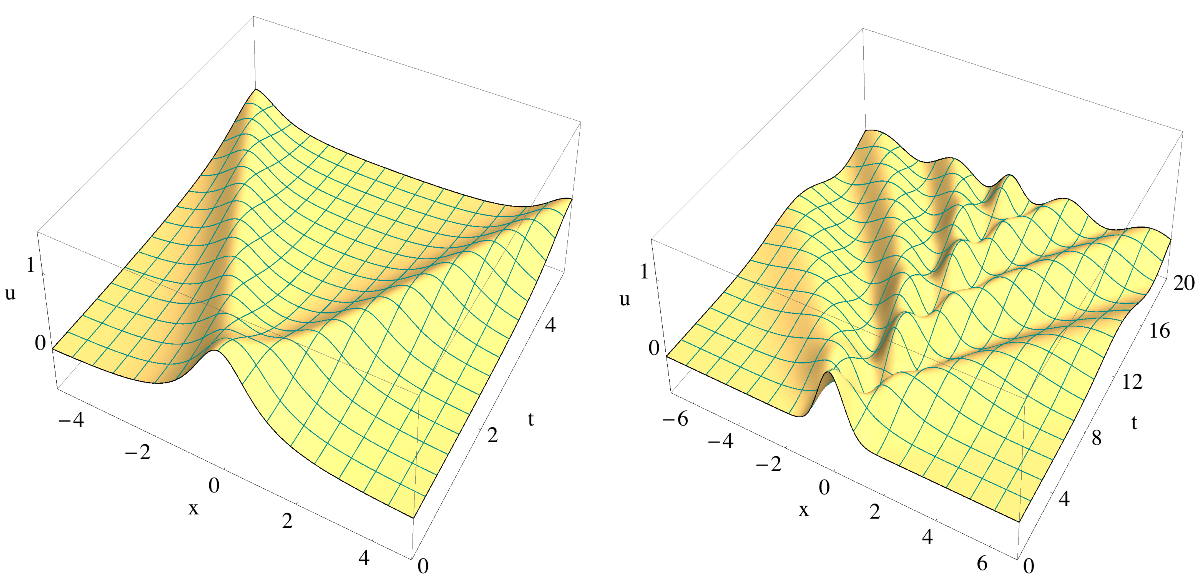

Figure 2: Wave separation on $\mathbb{R}$ with vanishing initial velocity. Evolution of the classical (left) and nonlocal (right) wave equation solutions with continuous initial displacement and vanishing velocity. Classical and nonlocal theories agree. Due to dispersion, we observe recurrent waves as an additional feature in the nonlocal case.

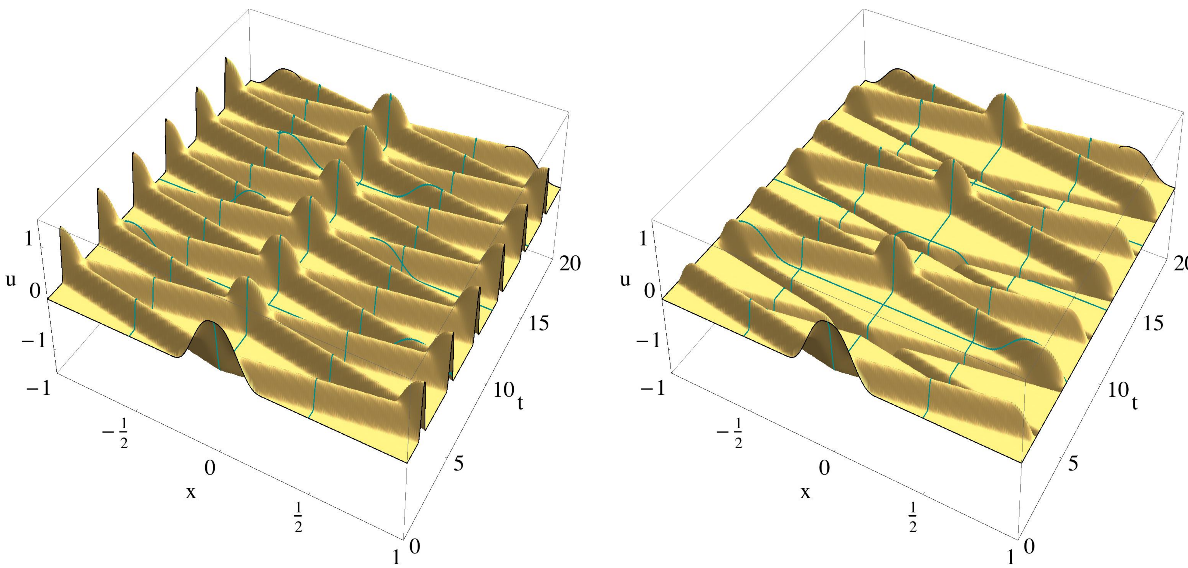

Figure 3: Boundary reflection of the classical wave equation on $[-1,1]$ with homogeneous Neumann (left) and Dirichlet (right) boundary conditions with vanishing initial velocity. Waves are reflected from the boundary with the same and opposite sign in the case of Neumann and Dirichlet boundary conditions, respectively.

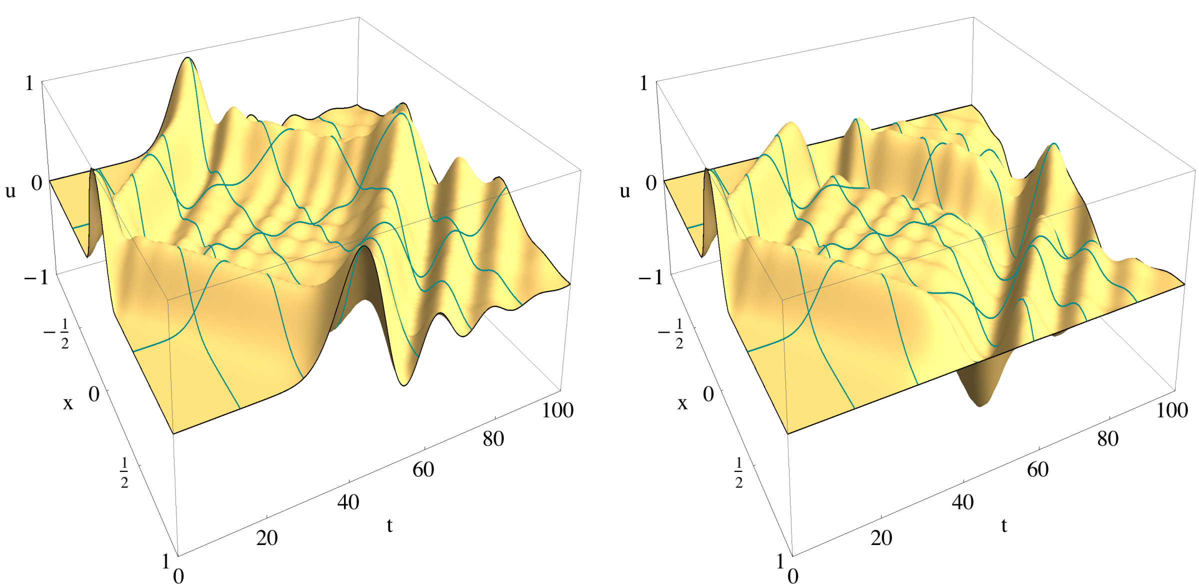

Figure 4: Boundary reflection of the nonlocal wave equation on $[-1,1]$ with homogeneous Neumann (left) and Dirichlet (right) boundary conditions with vanishing initial velocity and horizon $\delta = 2^{-3}$. We capture wave reflection patterns similar to the classical wave equation. Namely, waves are reflected from the boundary with the same and opposite sign in the case of Neumann and Dirichlet boundary conditions, respectively.