7. Real-life waves

In real life, there is always damping. This introduces a new term into the wave equation:

$$\boxed{\text{damped wave equation:} \quad \frac{\partial^2 u}{\partial t^2} + b\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}.}$$

Separation of variables still works, but in each normal mode, the $w(t)$ is a damped sinusoid involving a factor $e^{-bt/2}$ (in the underdamped case). But the eigenfunctions in the variable x are the same!

We can observe some of the features we've discussed in the previous pages in demo videos seen in the following pages. But note that you see damping in these videos as they are real-life rather than the idealized model we have been exploring.

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