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Exploring Physics Concepts with Computational Essays[1] ANDREA HOUCK, BHUJYO BHATTACHARYA, Lawrence Technological University — Computational essays communicate complex concepts using a combination of text, input code, and computer output. Due to their interactive nature, computational essays are ideal for investigating, describing, and demonstrating ideas in introductory physics. We demonstrate concepts such as simple harmonic motion and refraction of light using Mathematica as our computational platform. In this presentation, I will demonstrate how we create and animate a visual representation of a horizontal mass and spring system on a frictionless surface to help visualize a simple harmonic motion. The physics concepts are also communicated by plotting the position, velocity, and acceleration of the block as functions of time. In another computational essay, we determine the optical path of light rays through two or three media to visualize the apparent position of a fish in a pond or a tank. This essay helps us understand the ideas behind refraction of light. I will discuss how computational essays further allow us to test the limits of each problem and approach problems too difficult or time consuming to solve by hand.

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