Using Simulations to Teach Physics

Supporting Education with Online Computational Physics Resources

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Over the past dozen years the WebPhysics and Open Source Physics (OSP) projects have produced some of the most widely used computer-based curricular materials for the teaching of introductory and advanced physics courses. These materials are based on Java applets called Physlets and on new OSP programs and authoring tools. This session describes how we use these materials in the Davidson curriculum to motivate and engage students in computational physics modeling. In addition to learning to program, students are required to write and communicate, to develop their graphical design skills, and to apply mathematical reasoning to complex problems. We will demonstrate how physics can be taught by modeling, and how this approach helps to deepen the understanding of the underlying physical principles while supporting computational thinking. Examples are available on the Davidson College Moodle site and in the ComPADRE National Science Digital Library.

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Using PhET Interactive Simulations to enhance teaching and learning in online physics courses

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The PhET Interactive Simulations project at the University of Colorado Boulder has developed 127 free interactive simulations for teaching and learning science, with over 90 covering physics topics (http://phet.colorado.edu). Each simulation provides a highly interactive environment which supports scientist-like exploration, makes the invisible visible, includes the visual models that experts use, and emphasizes the connections between real life phenomena and the underlying science. Session participants will share and discuss strategies for implementing these flexible tools in online learning environments, and examine how they can help address content, process, and affective goals. Finally, we will preview plans and solicit input for next-generation PhET simulations that aim to further enhance use in online learning environments, including development in iPad-compatible HTML5, optimization for touch-and-mouse interfaces, and inclusion of expanded data in/out support.