

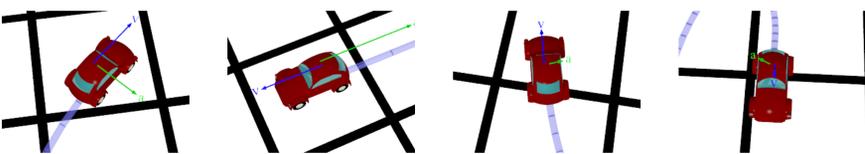
Physics Animations at Penn State Schuylkill

Michael R Gallis (mrg3@psu.edu)

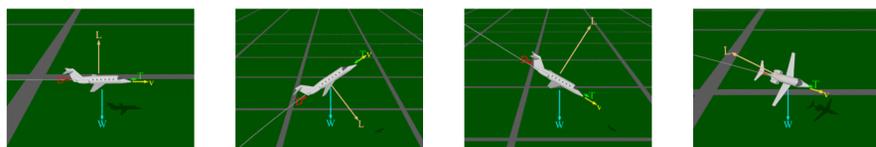
Abstract

At Penn State Schuylkill, short 3-D animations have been developed to illustrate basic concepts in physics and astronomy. The animations are used in lecture and are also available via the web. This poster presents some of the recent additions to the current collection of over 185 animations. "Whats wrong" tasks using artificial video created for use with video analysis software is shown. Some preliminary results from some pilot work on assessment is shown.

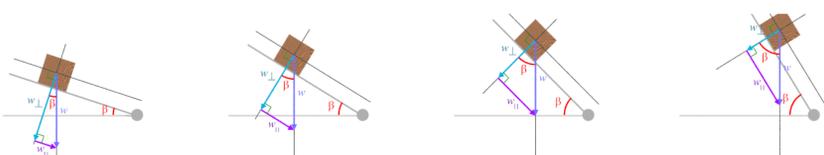
New Animations: Mechanics



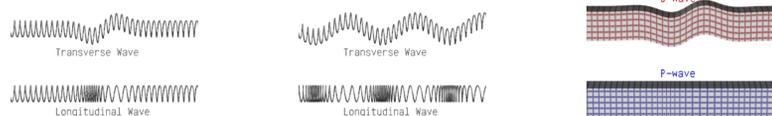
Kinematics in 2-D: The roles of velocity and acceleration are illustrated by watching an automobile undergo a series of maneuvers.



Motion in 3-D: Lift, weight thrust and drag play roles in the changing motion of an aircraft in flight.

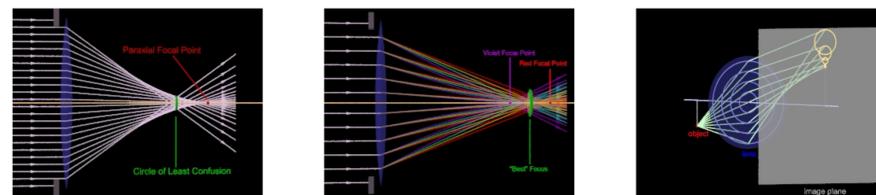


Components of Weight: The components of weight relative to a ramp and corresponding geometry vary with the angle of slope of the ramp.



Transverse and Longitudinal waves are depicted as both pulses and harmonic waves on a slinky and as pulses within a solid.

New Animations: Optics



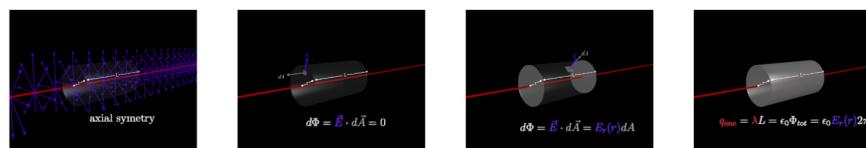
Spherical, chromatic and coma aberrations.

New Animations: Thermo and Fluids

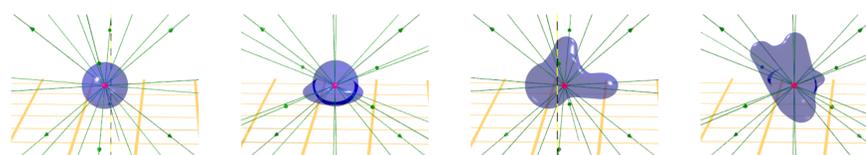


Volume is conserved in incompressible fluid flow.

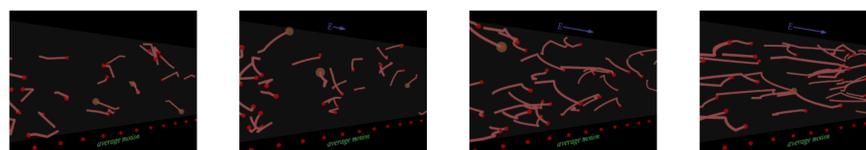
New Animations: E&M



An application of Gauss's Law: determining electric fields for geometries with cylindrical symmetry.

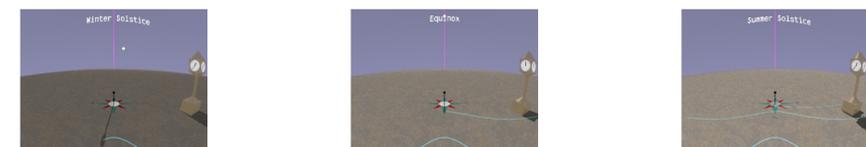


A graphic illustration of Gauss's Law for a point charge, where the field lines emanating from the point charge go through a distorting closed surface containing the charge.

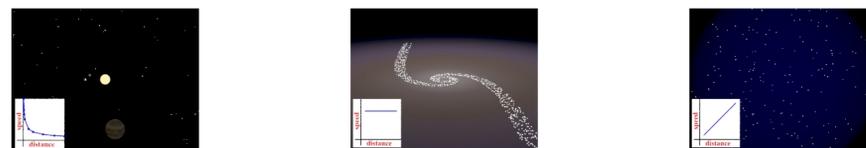


Random walk becomes flow as an electric field is turned on in this illustration of the theory of metallic conduction.

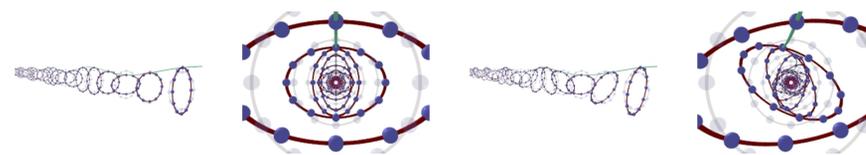
New Animations: Astronomy



This animation tracks the path of a gnomon's shadow over the course of the day as well as the seasonal variation of that path.



This series of animations illustrates rotation curves for several scenarios.



The stretching and compressing of gravity waves, showing linear and circular polarization.

The Creative Commons License

<http://creativecommons.org/licenses/by-nc/2.0/>

Attribution-NonCommercial 2.0

You are free:

- * to copy, distribute, display, and perform the work
- * to make derivative works

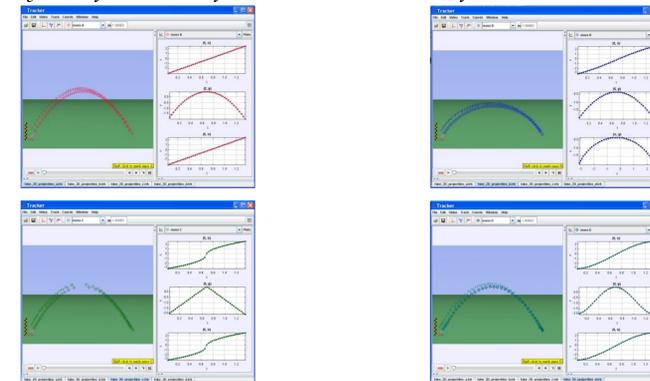
Under the following conditions:

Attribution. You must attribute the work in the manner specified by the author or licensor.

Noncommercial. You may not use this work for commercial purposes.

What's Wrong With This Picture?

Analysis of Artificial Video Using Tracker:
only one of the scenes follows our usual model for ballistic motion



Coming Soon: Pseudo Millikan Oil Drops, now with fractional charges!

Assessment

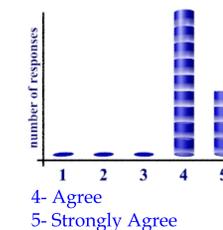
Student Surveys:

Indicate how strongly you agree or disagree with each of the following statements: Because of the way this course uses Multimedia Course Materials:

I am better able to understand the ideas and concepts taught in this course.

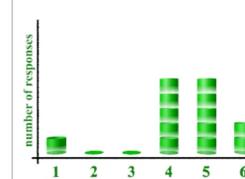


I am better able to understand the ideas and concepts taught in this course.

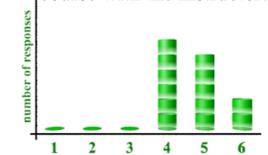


Think about a similar course you have taken that relied primarily on a simple lecture format. Compared with that course, because of the way this course uses **Multimedia** (computer-generated text, graphic, and/or video illustrations used to enhance a presentation or lecture): **how likely are [were] you to**

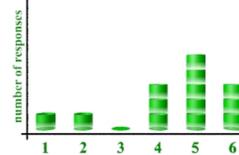
...enjoy the lectures for this course.



...discuss the ideas and concepts taught in this course with the instructor.



...apply what you are learning to "real world" problems.



- 1- No Basis for Judgment/Not Applicable
- 2- Much Less Likely
- 3- Somewhat Less Likely Likely

- 4- About the Same
- 5- Somewhat More Likely
- 6- Much More Likely

Learning Gains:

We are trying to make some measurement of the effects on student learning gains, borrowing from standard tools such as the Force Concept Inventory. Currently we are working to increase our sample size and implement less classroom time intrusive testing methods (such as IR/RF "clickers").