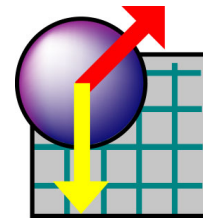# Interactive Physics 2004 New Features*

Overview

1. **Curriculum workbook and simulations** (for Windows and Macintosh)
2. *Interactive Physics Workbook* **and simulations** (for Windows and Macintosh)
3. **Improved graphing capabilities**
4. **Instantaneous vector values can be displayed with vectors**
5. **Updated user interface**
6. **Color of bodies linked to formula language and can change on the fly**
7. **Feel the motion and/or collision**
8. **DC Motor and DC Actuator**
9. **Generic Coord-to-Coord Constraint**
10. **Generic Point-to-Point Constraint**
11. **Dynamic memory allocation for objects**

*All features (except items 1 and 2) are for Microsoft® Windows® only (95/98/98SE/Me/NT®4.0/2000/XP)

## 1. Curriculum workbook and simulations - inquiry learning at its best

The Interactive Physics curriculum workbook empowers students to explore the physical world through easy-to-use, fast-paced simulations. Students are able to visualize the abstract concepts taught in the classroom, test hypotheses, and investigate "what-if" scenarios. Teachers appreciate the easy grading and disciplined structured environment with math and physics formulae.

📘 Full-colored teacher edition and black-lined master student edition
📘 New interactive experiments explore distance, speed, time, acceleration, projectile motion, gravity, air resistance, friction, weight, mass, highway safety, springs, Newton's laws, …
📘 Aligned with national and state curriculum standards and objectives
📘 Provides simple explanations and instructions for essential math and physics topics
📘 Created by Stanford Professor Paul Mitiguy and MSC.Software education consultant Michael Woo
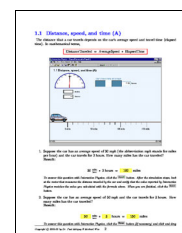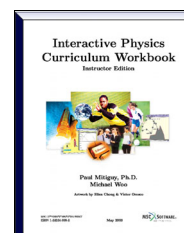
2. Interactive Physics Workbook and simulations - Advanced users (sold separately)

📘 Designed to help students visualize and work through physics problems with Interactive Physics simulations and accompanying worksheets
📘 40 problems of varying difficulty require students to change parameters/make predictions
📘 The workbook/study guide provides instructions, physics review, hints, and questions
📘 The accompanying CD-ROM contains everything students need to run simulations
📘 Created by Professor Cindy Schwarz of Vassar College, Professor John Ertel of the U.S. Naval Academy, Prentice-Hall, and MSC.Software. ISBN - 0130671088
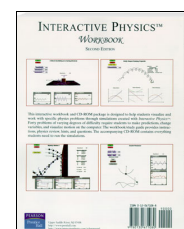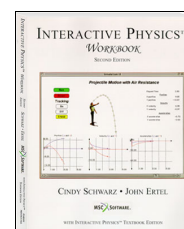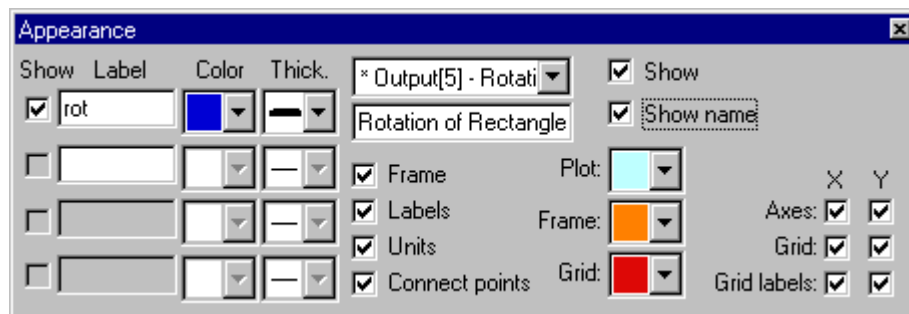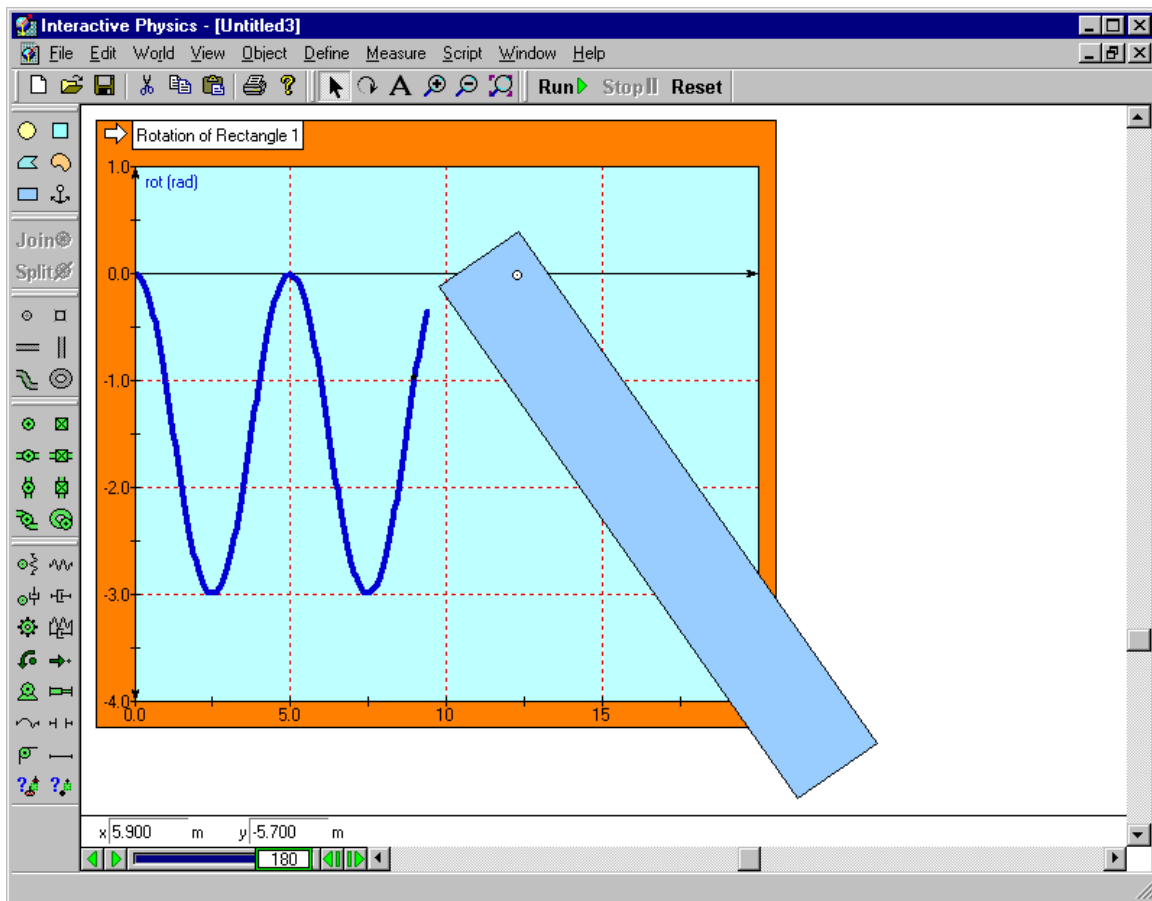
MSC SOFTWARE®
SIMULATING REALITY

3. Improved graphing capabilities

New graphing capabilities allow you to control:

🎨Thickness of curves and lines
🎨Plot background and frame colors
🎨Scaling of curves and lines
🎨Display of **X** and/or **Y** axes, grid lines, or grid labels
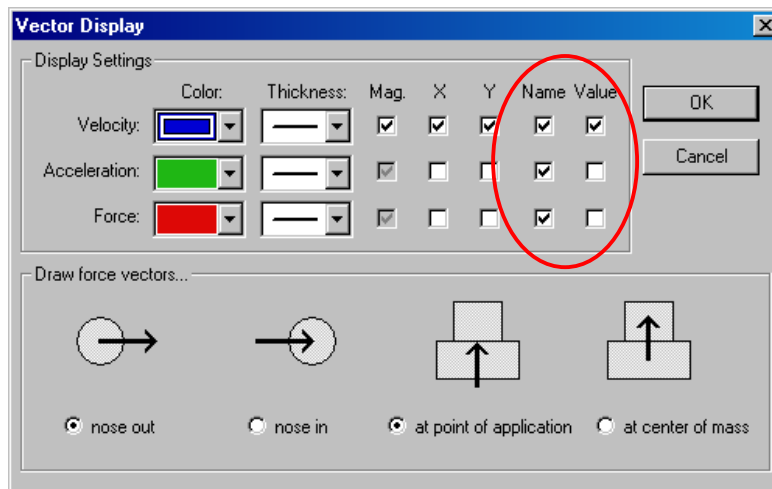🎨Grid line colors

New: Appearance dialog box for graphs

Showing a body's motion in an improved graph

4. Instantaneous vector values can be displayed with vectors

The value of various vectors and their components can be displayed on screen. The vector values change dynamically as the simulation runs and provides excellent visual feedback on the magnitude/direction characteristics of vectors.


Updated Vector Display dialog box

Instantaneous values shown with the vectors


Note: Vector values change as the simulation runs
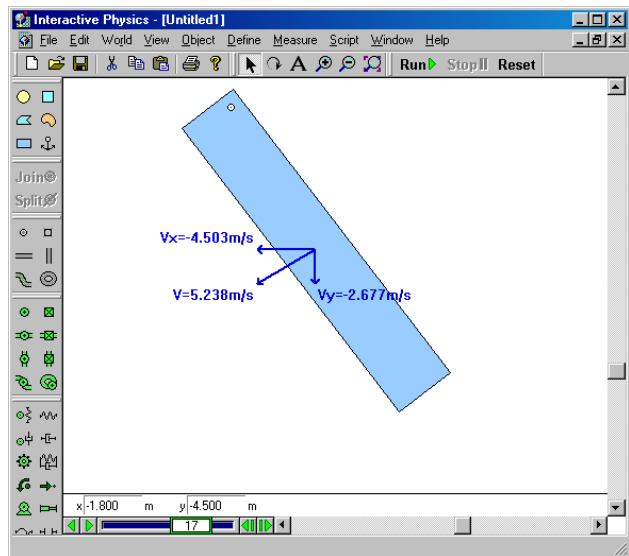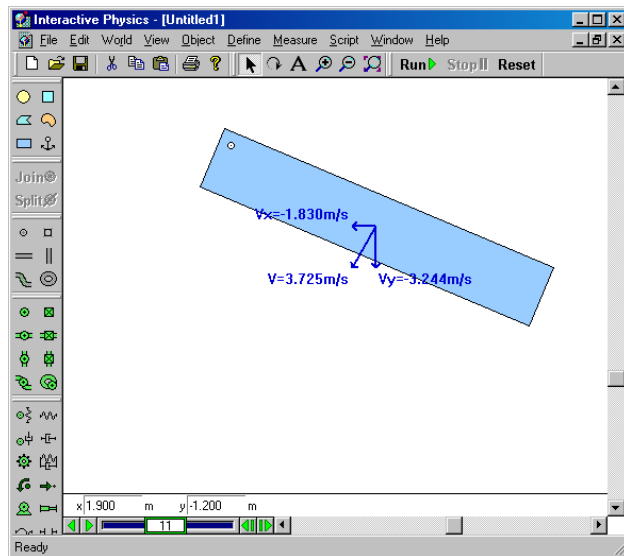
5. Updated user interface

1. New default colors for bodies
2. New graphs and graphing options
3. Vector values can be displayed with vectors
4. New meter for feeling motion and/or collision (requires a force-feedback mouse or joystick)
5. New colors in the Run toolbar
6. New DC motor and DC actuator
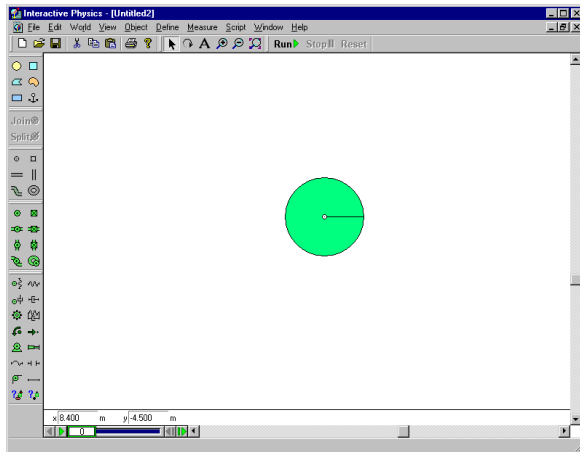7. New generic joints
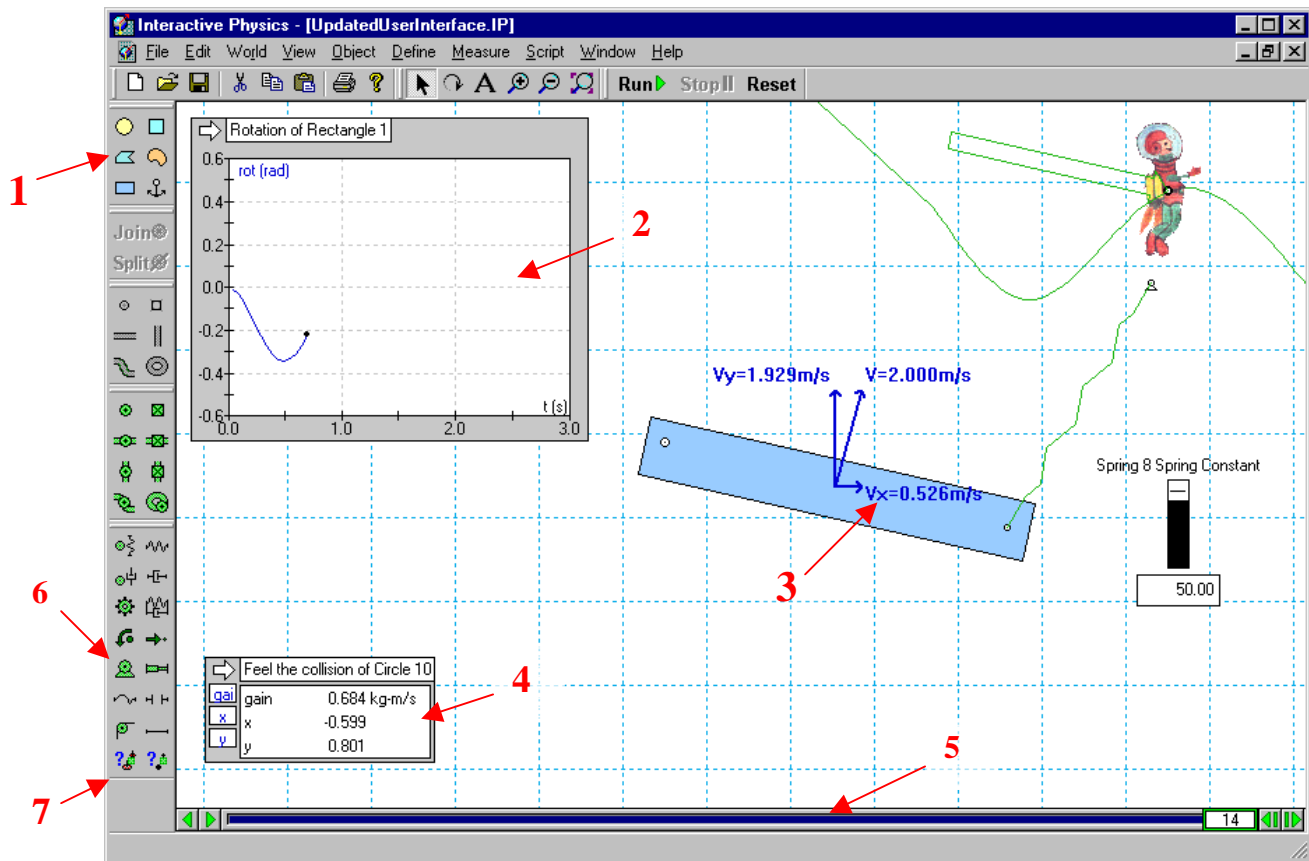
6. Color of bodies can be linked to a formula and vary with time, velocity, force, …
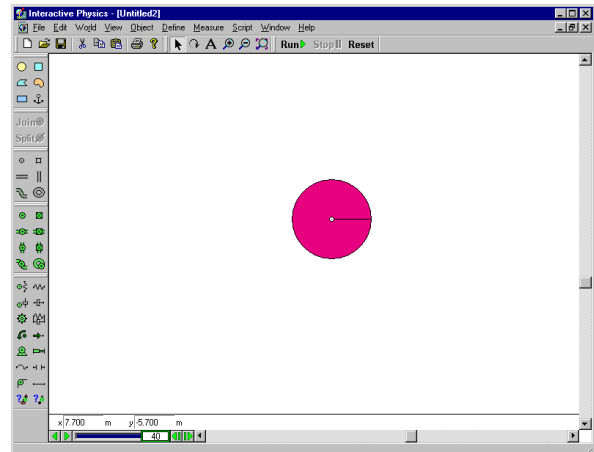
Color of bodies can be controlled with the extensive Interactive Physics formula language. Enter constants, equations, conditions, etc., in the RGB components of the body color.
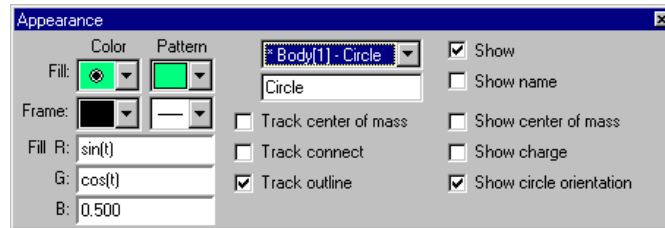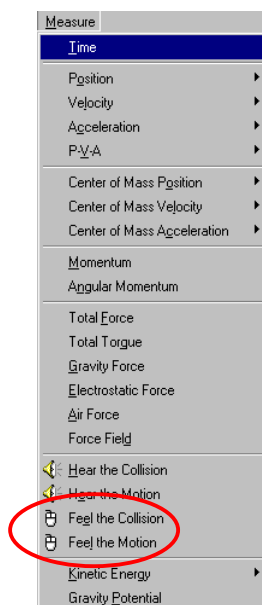

Appearance dialog box for bodies
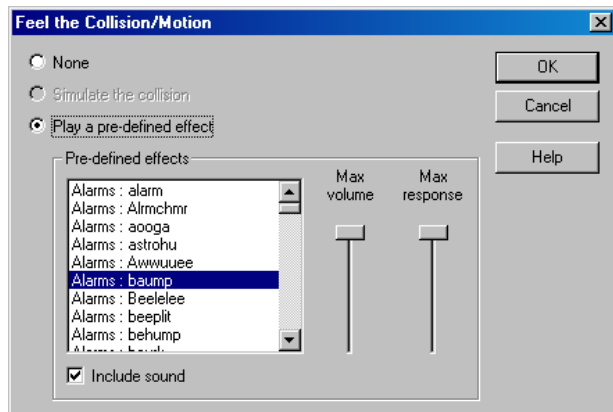

Body color at frame 0 (t= 0 s)

Body color at frame 40 (t = 2 s)

7. Feel the motion and/or collision (requires a force-feedback mouse or joystick)

Feel the motion and/or collision of bodies through a force-feedback mouse or joystick. Choose the default effect or an effect from the Immersion Studio library of mouse and sound effects.

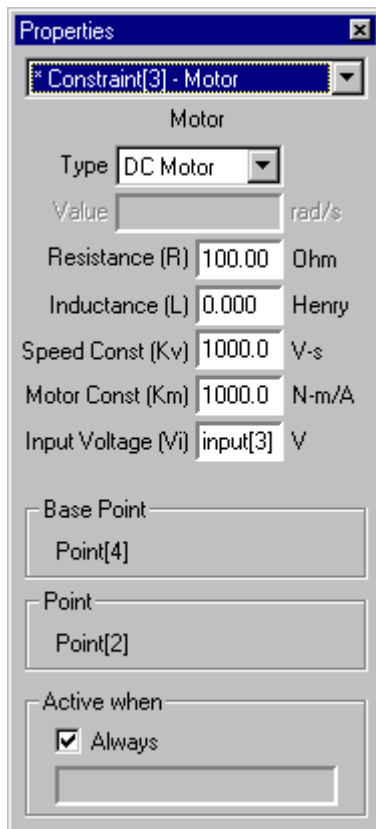Select Feel the Motion or Feel the collision

Choose haptics effects, volume, and response
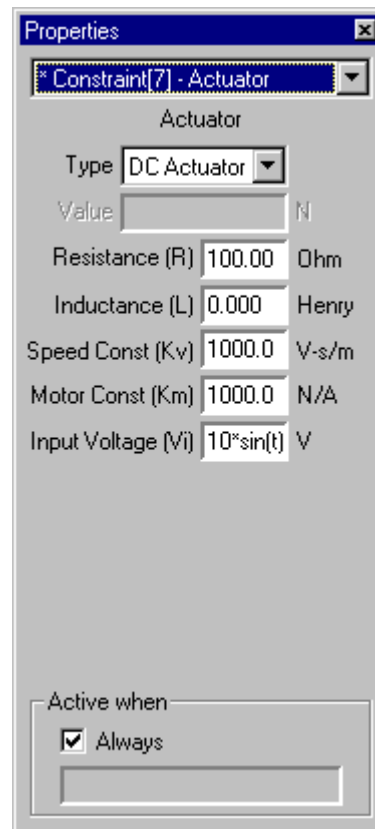
5

8. DC Motor and DC Actuator

Model DC motors and DC actuators with the following input parameters:

📖 Motor Resistance (R)
📖 Motor Inductance (L)
📖 Motor Back-EMF Speed Constant (Kv)
📖 Motor Force/Torque Constant (Km)
📖 Motor Input Voltage (Vi)

The value of these parameters can be set with a number, slider, or any Interactive Physics formula.

DC motor properties   DC actuator properties

9. Generic Coord-to-Coord Constraint

🔲The Generic Coord-to-Coord **Pin** Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of various torque-producing devices, including torsional springs, torsional dampers, torque motors, rotational friction, and torques.

Generic Coord-to-Coord Properties - **Pin**

🔲The Generic Coord-to-Coord **Slot** Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of forces along slots, including dampers, actuators, friction, and forces.

Generic Coord-to-Coord Properties - **Slot**

10. Generic Point-to-Point Constraint

The Generic Point-to-Point Constraint is a powerful tool for advanced users and is useful for combining properties and measurements of rods, ropes, separators, springs, dampers, actuators, and forces.

Generic Point-to-Point Properties

11. Dynamic memory allocation for objects

With dynamic memory allocation, the number of bodies, constraints, points, inputs, and output meters used in a simulation is limited only by your computer's memory.