COMPILATION: Unit 9 - Momentum motion maps

Date: Wed, 28 Feb 2001
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Subject: Momentum Motion Maps

Perhaps this has been mentioned by others, but it seemed a natural extension to make momentum motion maps since the tool already exists in kinematics. This is how I do it:

An arrow represents the direction and magnitude of the velocity and a circle of varying size on the tail of the arrow represents the mass. Below it I place another vector arrow representing the entire momentum of the object. I do the same for another object that is undergoing a collision, explosion, etc. The position of the circle (mass) is the location of the object. In the momentum picture underneath for a stationary object, it makes no difference how big the mass is, the momentum vector is just an unmoving dot.

Conservation of linear momentum with this picture employs a bit of head to tail addition, like you would describe for a non-zero net force. Add the two momentum vectors to determine the total momentum of the system. Surprise! The total momentum is the same before an interaction as it is afterwards BUT the velocities can be quite different. This approach has turned on a light of lightbulbs above the heads of my students.

I do not worry about the center of mass of the system "issue" – save that for calculus level instruction.

For those who are interested, contact me [for] the momentum motion maps on my web site. <http://faculty.une.edu/cas/jvesenka> Click on modeling.

Date: Mon, 27 Jan 2003
From: James Vesenka <jvesenka@une.edu>
... The momentum motion maps work well for my students, perhaps better so than conservation of energy. ... I'm happy to provide the **username** and **password** to teachers interested in the momentum materials.
Kind regards, Jamie
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