

A Classical Force Exchange Simulation

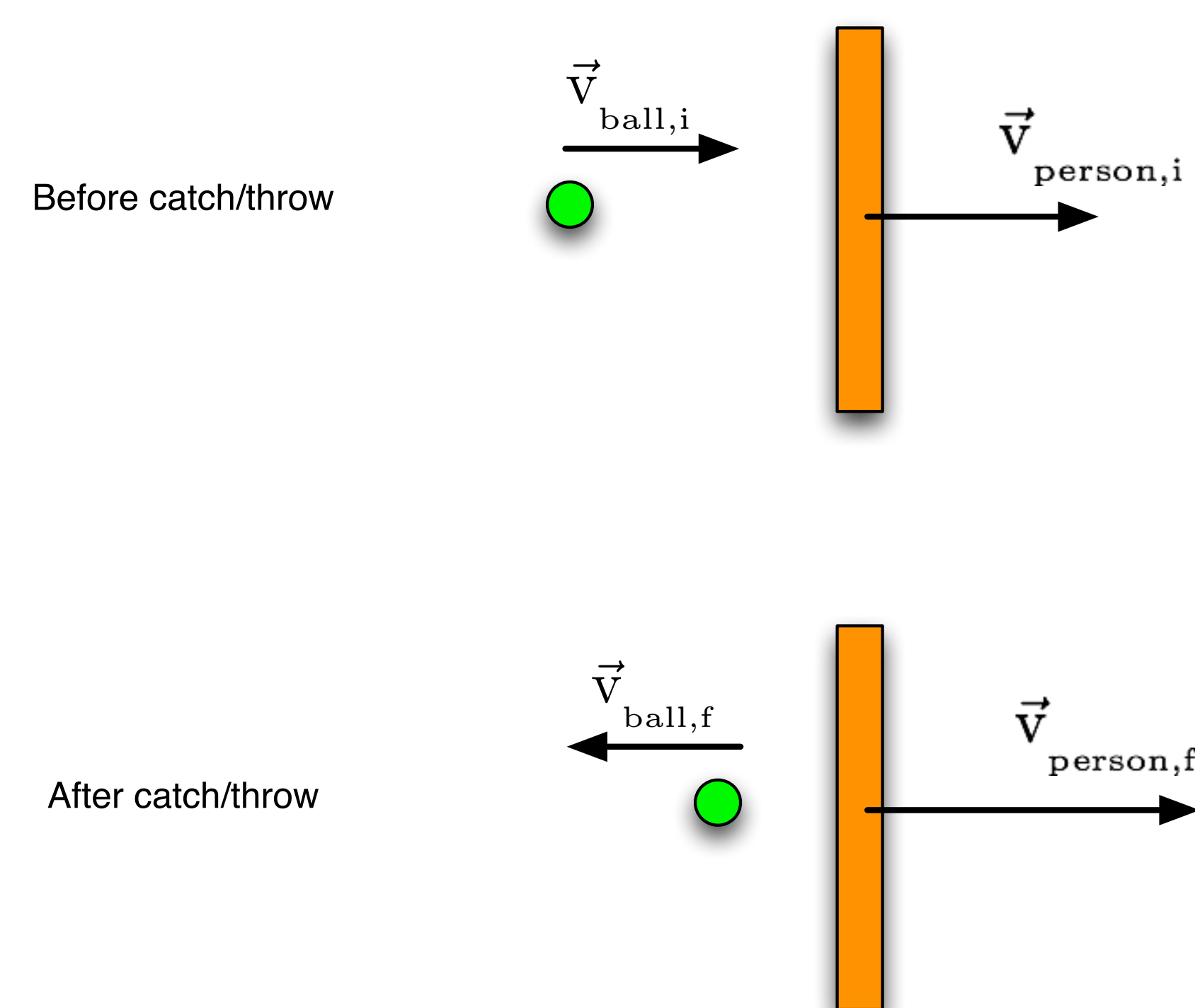
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Abstract

A classical force exchange refers to two objects that exchange a massive particle at constant speed. When the particle is “thrown” or “caught” by each object, it exerts an impulse on the object. As a result of this exchange, the objects accelerate away from each other with an apparent repulsive force. A simulation of the system was developed using Easy Java Simulations (EJS) in order to determine the distance dependence of this force as well as its dependence on other system variables. In this poster, the repulsive force, potential energy, kinetic energy, and total energy of the system will be presented.

Simulation

For each “collision” of the ball and person, momentum is conserved.



Simulation

Easy Java Simulations was used to simulate the motion of two people throwing a ball back and forth at constant speed.

Force vs. Distance

Model the two people as if they exert a repulsive force on one another. The force on a person is

$$F_x = M \frac{dv_x}{dt}$$

Data for x-velocity of the person just after each impulse was used to calculate the force on the person. The force was graphed as a function of distance r from the other person.

Results

References

- Easy Java Simulations. (<http://www.um.es/fem/EjsWiki/>)
- Open Source Physics. (<http://www.compadre.org/osp/>)

Acknowledgments

- The Department of Chemistry and Physics and the Department of Mathematics and Computer Science
- Dr. Gray Bowman, Chair of Department of Chemistry and Physics