

Homework 1: Collisions

Due: Tuesday January 29th, 13:00

Policy: Collaboration is allowed, but every student is required to hand in his/her own version of the solutions. Please include your name and student number on the solutions.

Problem 1. Two spheres (with masses $m_1 = 2$ kg and $m_2 = 10$ kg) move along mutually orthogonal lines towards each other with speeds $v_1 = 120$ m/s and $v_2 = 18$ m/s. After the collision the spheres remain attached to each other. In which direction and with which speed do they move immediately after the collision? What is the loss in kinetic energy?

Problem 2. Two smooth, identical disks A and B (uniform with mass m , and radius R) move with parallel velocities on a smooth, horizontal table. Their velocities are related by

$$\vec{v}_A = (2 + \sqrt{3}) \vec{v}_B.$$

The axes along which the two disks move are sufficiently close such that the two disks collide. One finds that the scattering angles after the collision are:

$$\theta_1 = -\theta_2 = \frac{\pi}{6}.$$

1. Demonstrate that the collision is elastic.
2. Determine the distance between the two axes.