

**Bachelor Lab Scientific Computing
(Game Physics)
Worksheet 6: Angular momentum and
microcollisions**

Assignment 1: Extend the collision handling by angular momentum

So far we considered only the linear momentum acting directly on the center of gravity of each object. Your task is to extend your physics engine by the inclusion of angular momentum in order to include rotational movements for the objects. Therefore, extend the methods for the time integration as well as the application of the collision impulse (similar to the case of the linear momentum).

As usual, you find more details about the implementation in the accompanying presentation slides.

Assignment 2: Damping microcollisions (optional)

Microcollisions are quite annoying when not handled appropriately. With an object laying straight on the top of (or very close to) a desk, the object interpenetrates the desk during a single timestep. During this timestep, the velocity of the object increases due to the simple Euler scheme that we used in our integrator. As the collision of the object with the desk and its respective deceleration are applied to the object only after finishing this timestep, the translational and angular velocities of the object already are unphysical! To damp these microcollisions, implement an extension to the previous assignment. Therefore, approximate the (unphysical) velocity increase during the time of collision and the end of the frame by using the outcome of the `accelerationAccumulator`. Then, if a respective microcollision is encountered, decrease the velocity of the object by this estimate.

Good luck,

Roland & Oliver