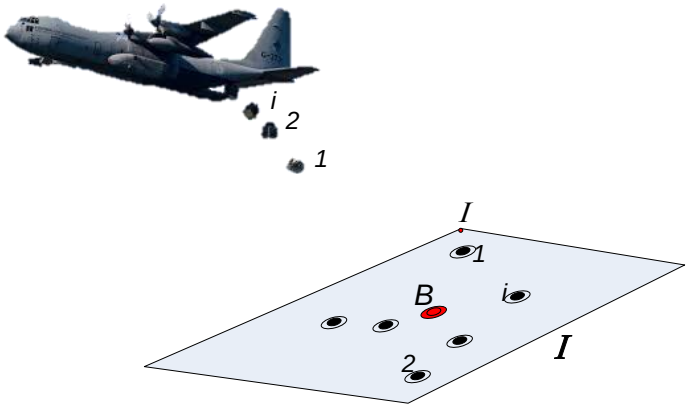
Assignments

Modeling Flight Dynamics with Tensors

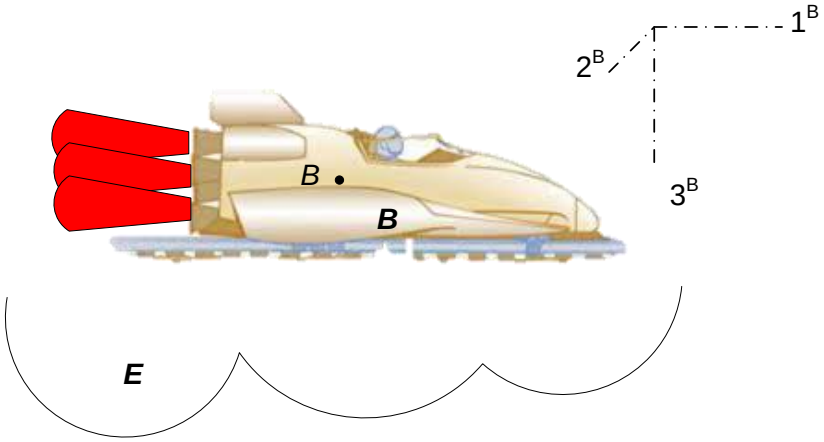
Lecture 6

Problem 1 Centroid of Delivery Pattern



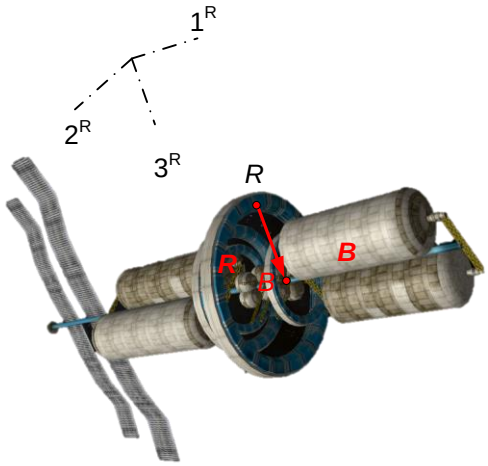
The Air Force conducts tests to determine the release conditions for cargo pallets. The criteria is the centroid *B* of the impact patterns with respect to a reference point I of the ground frame $\mathcal{I}$. The individual pallets are equipped with accelerometers and telemetry. Use Slide 5 to give the test crew some guidance how to determine $\mathbf{s}_{BI}$. Assume that the pallets can be modeled as point-mass with center-of-mass *i*.

Problem 2 Coriolis Transformation



You are racing down the Salt Flats at Bonneville Racetrack, Uta at you max speed of 600 *MPH* going North. What Coriolis and centrifugal accelerations do you experience? Can you feel them?

Problem 3 Grubin Transformation



You are journeying to Mars, cruising at constant speed. Your spaceship ***B*** has the capability to spin up its central rotational part ***R*** to provide you, located at *R*, with artificial gravity. Your distance from the c.m. of the spaceship *B* is in $]^R$ coordinates $[\overline{s_{BR}}]^R = [30 \quad 0 \quad 100]$ *m* and the spin-up rate is $\dot{\omega}^{RB} = 0.0001 \ rad/s^2$. How long do you have to wait until you experience the nominal Earth gravitational acceleration?. . You may neglect the start-up inertia transient.