Instantaneous Center of Velocity

(by P. Cornwell)

Three types of planar motion are examined in this class:

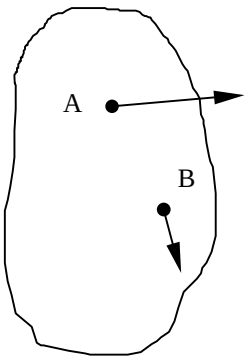
Type of motion	How to find the velocity of a point on the rigid body
1. Translation	
2. Fixed axis rotation	
3. General plane motion	a) b)

Definition of Instantaneous Center:

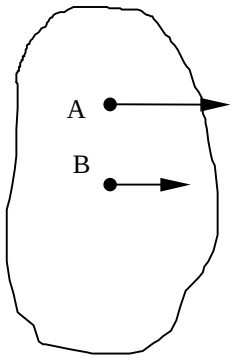
The instantaneous center of velocity (IC) is a unique reference point which momentarily has a velocity of zero. Thus, as far as velocities are concerned, the body seems to rotate about the instantaneous center, that is, the velocity of any point on the rigid body is simply the angular velocity of the rigid body times the distance to the IC ($v_p = \omega r_{P/IC}$)

How to find the IC

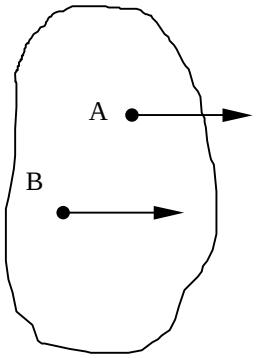
Case 1



Case 2



Case 3



Notes:

- The instantaneous center may lie off the body
- Once the instantaneous center is found the absolute velocity of any point on the body is readily determined
- The acceleration of the instantaneous center is not zero (in general) so it cannot be used to find the acceleration of points on the rigid body.
- For rolling without slipping on a fixed surface the IC is the point of contact.