Pursuit problem

Pursuit of an object, moving on a plane with predetermined speed with arbitrary trajectory.

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Problem description

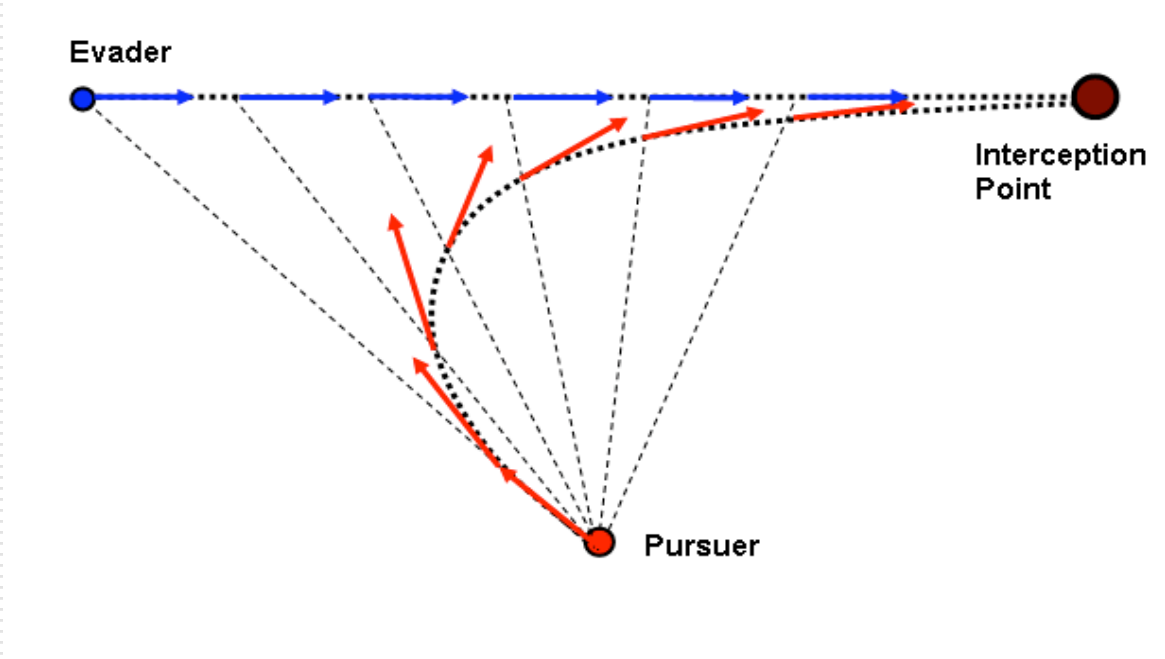
- There are two objects moving on a plane (further evader and pursuer), with arbitrary coordinates at initial moment of time t_0.
- Evader and pursuer move by some smooth trajectories, with constant speeds v_1 and v_2, ($|v_2|>|v_1|$).
- The goal of pursuer is to occupy the same position on the plane as evader, at some moment of time $t_i > t_0$.

Pursuit strategies

Method of a pursuit curve

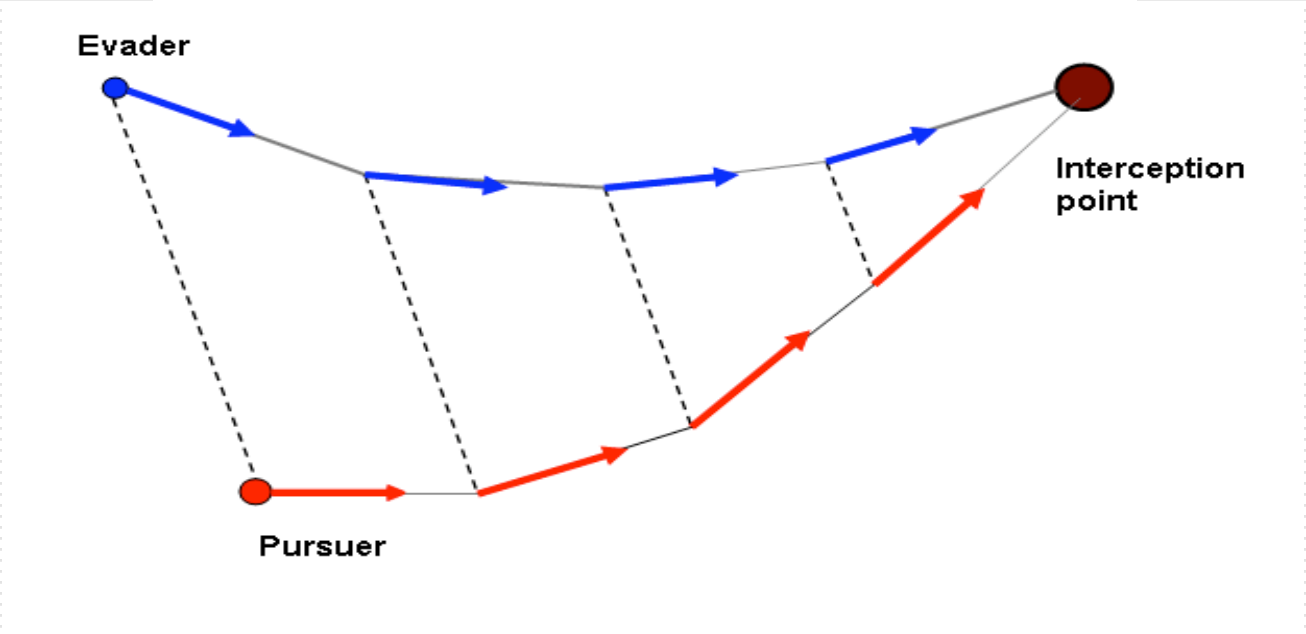
Method of parallel pursuit

Method of pursuit curve



- The key point of this method is the velocity of the pursuer is pointed to the current position of evader any moment of time.

Method of parallel pursuit



- In this method, velocity of the pursuer is pointed to some assumed intersection point of their trajectories. If trajectory of evader changes, the direction of velocity for the pursuer will change as well.

Objectives

- Design numerical simulation of pursuit problem, using methods of pursuit curve and parallel pursuit.
- Compare these two methods for similar initial conditions and make a conclusion about their effectiveness.
- Perform 2D real-time graphics simulation of pursuit problem using both methods.

References

- Petrosjan, L.A. *Differential Games of Pursuit.* World Scientific, Singapore, 1993.
- Kovshov, A.M. Two-Person Pursuit Game on the Half-Sphere – International Conference on Interval and Computer-Algebraic Methods in Science and Engineering INTERVAL ’94, Abstracts. St. Petersburg, pp. 148-149, 1994.
- Kovshov, A.M. *The Simple Pursuit by a Few Objects on the Multidimensional Sphere. International Year-Book of Game Theory and Applications*. Nova Science, New-York, vol.2, pp.27-36,1996.