Topics for Bachelor Theses

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1 Group chase and escape

Description

We consider two groups of agents: chasers and escapees. Chasers aim to catch all the escapees in a minimal time. The maximal velocities of the chasers are less than the maximal velocities of the escapees. Hence, the catch is only possible by a coordinated movement strategy of the chasers.

Tasks

- to develop rules for local interaction between chasers in order to reduce the total time of the chase (model-based or machine learning approaches are possible);
- to study the influence of communication abilities between agents on the total time of the chase.

References

[1] Kamimura, Atsushi, and Toru Ohira. "Group chase and escape." *New Journal of Physics* 12.5 (2010): 053013.

[2] Vicsek, Tamás, and Anna Zafeiris. "Collective motion." *Physics Reports* 517.3-4 (2012): 71-140.

[3] Mnih, Volodymyr, et al. "Human-level control through deep reinforcement learning." *Nature* 518.7540 (2015): 529.

[4] Janosov, Milán, et al. "Group chasing tactics: how to catch a faster prey." *New Journal of Physics* 19.5 (2017): 053003.

2 Funnel control for impulsive systems

Description

A short description here. Maybe a picture of a funnel.

Tasks

- Task 1;
- Task 2.

References

[1] Ilchmann, A., Ryan, E., and Sangwin, C. (2002). Tracking with prescribed transient behaviour. *ESAIM: Control, Optimisation and Calculus of Variations*, 7, 471-493. doi:10.1051/cocv:2002064