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Autonomous robotics

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Exercise 4 Attractor Dynamics for vehicle cooperation

Read the paper by Machado et al.: Attractor dynamics approach to joint transportation by autonomous robots: theory, implementation and validation on the factory floor *Autonomous Robots* **43**:589610 (2019) [available on the web page].

The first part of this paper is a brillant review of the attractor dynamics approach you have studied. The new aspect is coordination between a "leader" (L) and a "helper" (H) robot vehicle.

1. Read in depth Section 4 of the paper. Sections 4.1.1. and 4.1.2 reprise what we did in the lecture. Make a simple drawing that explains Eq. (6) and then derive Eq. (9) and explain its implications.

2. Read Section 4.1.3 carefully. This is the core problem of the paper. Write down the key idea of that approach without using the detailed equations, but making a simplified drawing to support your explanation.

3. Explain what is happening in Figure 9. [You can assume that the contribution, f_{desvir}, creates an attractor in an averaged direction between the direction to the real and to the virtual target without going into detail, see Section 4.1.4.].