Distributed formation control for autonomous robots

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Stellingen
behorende bij het proefschrift

Distributed formation control for autonomous robots

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1. Mismatches on desired distances and biased measurements from range sensors may have induce the same motion in a formation. (Remark 2.18.)

2. Rule of thumb for dealing with an undesired effect in a robotic system: employ the effect itself or the cause of the effect to drive the dynamics of an estimator. (Theorems 3.1, 3.8, 6.7 and 6.10.)

3. The analysis about how to choose the estimating agents can also be employed to check the local stability of formations with a directed sensing topology. (Assumption in Theorem 3.1 and Assumption 6.9.)

4. Distributed disagreements, when taken as design parameters, can agree with a centralized plan. (The control design in Section 4.1.)

5. It is possible to simultaneously achieve a desired shape, a prescribed translational/rotational motion, and time-varying scale of the shape by means of a single formation control law. (Chapters 4 and 5.)

6. Setting a disagreement for a desired distance is equivalent to designing the robot's velocity/acceleration employing the desired geometry of the formation. (Equations (4.2), (5.18) and (6.40) together with Figure 5.3.)

7. Regardless of the order (first or second) of the robot's dynamical model, a formation of robots having mismatches in the desired distances will have exactly the same undesired effects: a distorted steady-state shape and a collective helical motion. (Theorem 6.4.)