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Abstract:
In this work we present Snookie, an autonomous underwater vehicle (AUV) with an artificial lateral-line system (ALL). Integration of the ALL with other sensory modalities is to enable the robot to perform behaviours as observed in fish, such as obstacle detection and geometrical-shape reconstruction by means of hydrodynamic images. The present chapter consists of three sections devoted to design of the robot, its lateral-line system, and processing of the ensuing flow-sensory data. The ALL of Snookie is presented in detail, together with a simple version of a flow reconstruction algorithm applicable to both the ALL and, e.g. the blind Mexican cave fish. More in particular, the first section deals with the development of the AUV Snookie, which provides the functionality and is tailored to the requirements of the ALL. The second section is devoted to the implementation of the ALL that consists of an array of hot thermistor anemometers to be integrated in the nozzle. In the final section, the information processing ensuing from the flow sensors and leading to conclusions about the environment is presented. The measurement of the tangential velocities at the ALL together with the no-penetration condition provides the robot with Cauchy boundary conditions, so that the hydrodynamic mapping of
potential flow onto the lateral line can be inverted. Through this inversion information is accessible from the flow around the artificial lateral line about objects in the neighbourhood, which alter the flow field.