Abstract:
In human-robot interaction (HRI) and especially in close or physical interaction, it is essential to ensure the human’s safety. This is achieved by introducing virtual constraints defining a region, in which the robot is allowed to move safely. These safety regions may change over time during human-robot interaction, which may be either due to human motion or changed environmental conditions. In consequence it is important for the applied control scheme to handle dynamic boundaries. This work proposes an invariance-based control approach, which enforces adherence to boundaries with dynamic parameters. We extend the invariance control approach, which provides a computationally efficient and systematic method for defining constraints on system states and outputs, such that it handles the constraint dynamics. Stability and invariance properties are analyzed and validated in an experimental evaluation on a 7-DoF anthropomorphic manipulator.