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## Sliding Mode Control Approaches Applied to Trajectory Tracking for Non-holonomic Mobile Robots

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### Abstract.

Sliding Mode Control (SMC) has been demonstrated to be a robust solution to control nonlinear systems under the presence of model uncertainties and disturbances. Therefore, this work shows the design, implementation, and comparison of three controllers based on the SMC concepts. The three controllers implemented are a conventional SMC controller and two variants: Dynamic Sliding Mode Control (D-SMC) and Dual Sliding Mode Control (DM-SMC). These controllers were designed based on an approximated model, which makes them suitable to control any system whose behavior can be approximated to a First Order Plus Delay Time (FOPDT) system. In this paper, the performance of the three controllers was evaluated for solving the Trajectory Tracking Problem (TTP) of a Non-holonomic Mobile Robot (NMR) in three different trajectory types. The results of each controller were quantified by performance indices and compared to a typical PI controller showing the advantages and disadvantages of each controller according to the case tested.

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