Solving The Singularity of Car Like Robot With Back Trailer

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Abstract—This paper proposes a novel model for a car like wheeled mobile robot with back trailer. The proposed model is the first step in developing an auto parking control system for assisting non-professional drivers. The kinematics analysis of the front car shows the singularity problem of the system, which is expressed by means of non-holonomic constraints. A virtual new actuated kinematics is developed to overcome this problem. The inverse and forward kinematics of the front car and the back trailer are also solved in this paper. Two simulation examples results are presented to illustrate the performance of the new kinematics solution.