The Study of Three-Dimensional Tank Dynamics

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ABSTRACT

This thesis develops the mathematical models of tank motion for the applications of real-time simulation. Three dimensional models including hull, turret and barrel are deduced by the Euler-Lagrange equations in quasi-velocity. The contact points between the road wheel and the road surface are computed. To reduce the load of real-time computation, all the forces from the ground are assumed to concentrate on the tracks under the ground wheels. The normal force and frictional force at these contact points are computed to simulate the tractive and braking behavior of the tank dynamics. The model developed is verified in a case of computer simulations. The symbolical mathematical software MAPLE is used to derive the equations of motion. The different computation simulations are given to test the applicability of the dynamical model. Some of the simulation results are compared and verified with those from ADAMS.

Keywords : Tank ; contact force ; quasi-velocity ; real-time simulation

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