SM17L_12582

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Motion and Vibration Control of the Lift Mechanism of a Ladder Truck

Katsuhisa Fujita(1), Yasuhiro Shiono(1), Mitihiro Itihara(2), Takuro Koseki(2)

(1) *Osaka Pref. Univ., Osaka, Japan*
(2) *Morita Co. Ltd., Japan*

A ladder truck with lift mechanism has played an important role in life-saving and fire-fighting. Although the quicker operation mechanism is requested for these demands, the lift operation generates a lot of vibration at the time of the extending and retracting motions, the ascending and descending motions, and turning motion. In this paper, though an actual ladder truck is composed of five sections, a two-sections ladder model is investigated to make the physical understanding easier. A coupled equation of the model is derived using the differential algebraic equation. Performing the numerical simulations taking the dimensions of the model and the modification of the input motion as parameters, the physical meaning of the dynamic behavior at the time of the lift operation is discussed. Moreover, the optimal control method for minimizing the vibration and the moving time of a ladder simultaneously is discussed.

View the extended summary