

ABSTRACT

LINEAR DOOR MOTOR SYSTEM FOR ELEVATORS

A linear motor is used to actuate an elevator door in response to a control signal for counteracting rotational torque caused by a variable-length moment arm (X_1) about the center of gravity of the door by varying the magnitude of a linear force (F_{lin}) exerted on the door acting through a fixed-length moment arm (H_{cg}) about the center of gravity of the door for providing an opposing rotational torque, thereby counteracting the rotational torque caused by the normal force (F_n). The first and second rotational torques may be controlled to decrease and increase linearly as the door goes through its motion. In this way, the velocity profile varies in a curve similar to one side of the major axis of an ellipse. The normal force may be provided so as to levitate the door to reduce gravitational forces acting on door rollers. The control may be carried out in an open- or closed-looped fashion.

Fig. 7