

東海大学



士論文

Improvement of Mobility and Stability for Small Electric  
Vehicle: Integration of Oversteering Characteristic, Four  
Wheel Drive and Independent Steering

(オーバーステアリング特性、四輪駆動と独立操舵の  
統合による小型電気自動車の運動性と安定性の向上)

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## Nomenclatures

$B_F$	braking force (N)
$b$	width of the interacted tire surface, 0.1, (m)
$C$	regenerative brake coefficient
$d_F$	front tread, 0.840, (m)
$d_R$	rear tread, 0.815, (m)
$g$	gravitational acceleration, 9.81, (m/s <sup>2</sup> )
$h$	center gravity of the vehicle, 0.105, (m)
$I$	yaw inertia moment at the center gravity point of the vehicle, 1470, (kgm <sup>2</sup> )
$I_\omega$	inertia moment of the tire, 2.53, (kgm <sup>2</sup> )
$K_x$	the rigidness of the tire in longitudinal axis, 1.333x10 <sup>6</sup> , (N/m <sup>3</sup> )
$K_y$	the rigidness of the tire in lateral axis, 1.333x10 <sup>6</sup> , (N/m <sup>3</sup> )
$K_f$	
$l$	length of from front wheel axle to the rear wheel axle, 1.28. (m)
$l_F$	the length from front wheel axle to the vehicle center gravity point, 0.725, (m)
$l_R$	the length from rear wheel axle to the vehicle center gravity point, 0.525, (m)
$l_T$	length of the interacted tire surface, 0.15, (m)
$m$	vehicle mass, 421.61, (kg)
$P$	pressure (Pa)
$R$	radius of the brake shoe
$r$	wheel radius, 0.23, (m)

$T$	torque (Nm)
$t$	time (s)
$u$	vehicle velocity in the longitudinal direction (m/s)
$v$	vehicle velocity in the lateral direction (m/s)
$V$	vehicle velocity at the center of gravity (m/s)
$W_z$	wheel load (N)
$X$	the longitudinal force acting on the tire (N)
$Y$	the lateral force acting on the tire (N)
$\beta$	side slip angle of the vehicle (rad)
$\beta^*$	side slip angle of the state observer (rad)
$\beta_T$	side slip angle of the tire (rad)
$\theta$	steering angle (rad)
$\gamma$	yaw rotational speed of the vehicle (rad/s)
$\gamma^*$	yaw rotational speed of the state observer (rad/s)
$\mu$	friction coefficient
$\rho$	slip ratio
$\omega$	tire angular velocity (rad/s)

Subscripts:

$F$	front
$R$	rear
$FR$	front right
$FL$	front left
$RR$	rear right
$RL$	rear left



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