Educational research fields

Graduate School of Science and Engineering,
National Defense Academy
Mechanical Engineering
Dynamics System

Mechanical Dynamics

Professor Dr. Hideya Yamaguchi
Associate Professor Dr. Hidehisa Yoshida

In order to operate the machine along the purpose and to achieve the high performance, it is indispensable to clarify the kinetic and dynamic characteristics and cope with the vibration problem. Subject of our research covers areas from the basic dynamic problem on kinematics, vibration and mechatronics, to the application research on mechanical design, control system design, vehicle design (automobile & railway etc.,) and human interface design.

Update: June 6, 2012
Study on passive vibration isolation system using linear friction damper

In order to overcome drawbacks of the ordinary friction damper, we propose a new type of friction damper. This is achieved by use of an inclined lever, which contacts the cylindrical block by means of a rotational spring, causing the normal and frictional forces at the contact surface to vary according to the displacement of the cylindrical block.

The force $Q$ increases when the displacement $x$ increases. At a moment that $x$ starts to decrease, $Q$ inverts its sign and then asymptotically approach zero.


Update: June 6, 2012
Study on Resonant-type optical scanner

Although a polygon mirror is used in the laser scanning exposure part in a laser beam printer, a new system is examined for the further improvement in performance. In order to improve the performance in the speed, miniaturization, and low-power-consumption of an optical scanner, it is proposed about the new resonant-type optical scanner using MEMS (Micro Electro Mechanical System) technology, and is investigating about the feasibility.
Advanced Driver Assistance System for Safety & Security

Advanced driver assistance micro universal vehicle

Automobile safety in small and micro-sized vehicles, including electric vehicles, is a concern, because their smaller size makes collision-related impacts potentially more damaging to the vehicle and its occupants. This study analyzes a collision avoidance technology designed to improve the safety of small or micro-sized vehicles using the active safety technology.

Sadakatsu Arai, Hidehisa Yoshida, Hideya Yamaguchi, Automatic Obstacle Avoidance System by Steered Vehicle using Active Wheels Torque Control of Traction and Braking, Proceedings of First International Symposium on Future Active Safety Technology toward zero-traffic-accident (FAST-zero’11), Tokyo, JAPAN, TS3-8-3-4 (20117398), September 5-9,2011

Update: June 6, 2012
Study on driver assistance system

In a steering system, the effect of steering assistance system, such as lane-keeping and automatic collision avoidance, is expected. In these systems, that interference arises between assistance system and driver operation must be avoided. Then, the proposal of a steering assistance system, effect evaluation of assistance control, and evaluation by the subject experiment by Driving Simulator which checks that a negative effect does not arise are considered.
Car body tilting system using variable link mechanism

In order to feel comfortable after securing safety in a vehicle, low vibration acceleration level which felt unpleasant, realizes reducing feeling of incongruity. Then, the new vehicle tilting control using a variable link mechanism which reduces simultaneously both acceleration which a passenger feels, and wheel load imbalance which is an index of the stability of vehicle is proposed, and verified by the experiment.