Dep. Mechanical Systems Engineering, Hiroshima Univ

Machinery Dynamics Lab
Robotics & Computation Group

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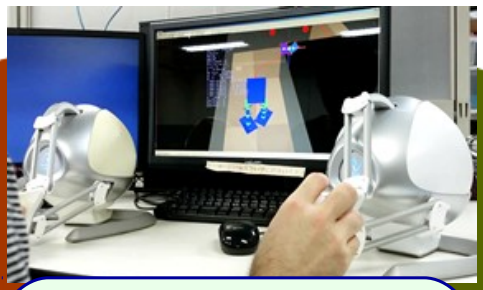
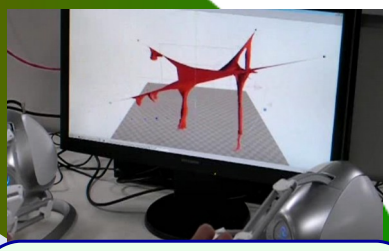
Our research group focuses on the control, simulation, and analysis of dynamical mechanical systems, especially of robotic systems. The research themes range from the fundamentals of computational and control theory to the development of various control and computing techniques intended for industrial applications.

New control scheme for stable & safe master-slave control



Controller development platform for master-slave biped robots

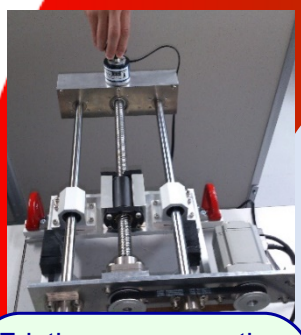


Stable numerical integration of hyper-DOF systems

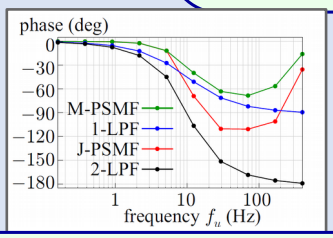
Theory

$$f = Ke + B\dot{e}$$
$$f \in -F\mathrm{sgn}(p + e + H(\dot{p} + \dot{e}))$$

Differential-algebraic relaxation of sliding mode systems



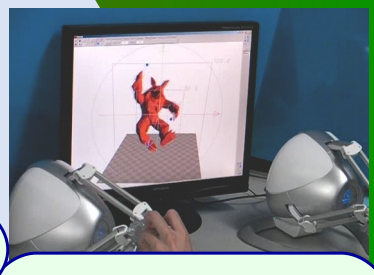
Friction compensation control



Noise-filtering and differentiators with small phase lag

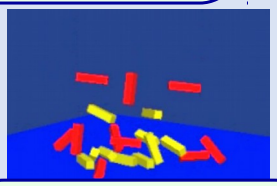
$$M(q)\ddot{q} + \Phi(q,\dot{q}) = J(q)^T\lambda$$
$$\begin{bmatrix} J_v(q)\dot{q} \\ \Psi_p(q) \end{bmatrix} \in -\lim_{\varepsilon\to+0} \mathcal{N}_{\mathcal{C}}^{U_\varepsilon}(\lambda)$$

Bounded Lagrange multipliers for mechanical systems

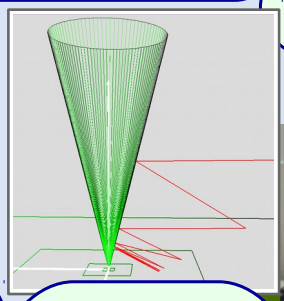


Fast computation of finite element method

Force-magnifying master-slave system



Contact-force computation in large-scale physics simulator



Fast solver for frictional contact problems

Vehicle simulation using fully-physics-based tire model

Force control techniques for human-robot interaction

Simulator-based controller development of multicopters

Robot Control

Computational Dynamics