工学系研究科専攻間横断型教育プログラム
「機械システム・イノベーション」

GMSI

最先端融合科学イノベーション
教育研究コンソーシアム

東京大学 THE UNIVERSITY OF TOKYO

CIAiS

第197回GMSI公開セミナー／第21回CIAiSセミナー

Passive and active hydraulically interconnected suspensions and their applications

Professor Nong Zhang

School of Mechanical and Mechatronic Engineering, University of Technology, Sydney, Australia
School of Automotive and Transportation Engineering, Hefei University of Technology, China
Department of Automotive Engineering, Tsinghua University, China

平成28年5月23日（月）15:00～16:30
場　所：東京大学　本郷キャンパス　工学部2号館31A

In this talk, the mechanism and modelling of system dynamics in the frequency domain of a vehicle fitted with a hydraulically interconnected suspension (HIS) using a 4-DOF half-car model is briefly presented. A set of coupled, frequency-dependent equations, which govern the dynamics of the integrated half-car system, are derived and the applications of these equations to both free and forced vibration analysis are presented. The experimental validation of the analytical results of the free and forced vibrations of the roll-plane half-car is provided.

A brief introduction is given on a 9-DOF model of a vehicle fitted with an HIS and simulations of a fishhook manoeuvre to assess its handling performance. The fluid subsystem of the HIS is modelled using a nonlinear finite-element approach, resulting in a set of coupled, first-order nonlinear differential equations, which describe the dynamics of the integrated mechanical and hydraulic vehicle system. Both the simulation and test results indicate that, in general, the HIS-equipped vehicle possesses superior handling performance, as measured by the sprung mass roll angle, roll rate, roll acceleration, lateral acceleration and the vehicle's Rollover Critical Factor.

The applications of the passive HIS to several vehicles are presented. The obtained results, which clearly demonstrate the superior performance of the HIS technology, are discussed. Furthermore, the semi-active and active HIS, including the mechanism of active HIS hardware and the motion mode dependent active control approach, are also briefly introduced. The preliminary experimental results on the active HIS are given to show the applicability of the active HIS mechanism and controllers. Discussions are also provided on the current issues encountered in applications of passive and active HIS and the future research challenges. Concluding remarks are given on the key findings obtained from the conducted studies.

主催：　東京大学大学院工学系研究科「機械システム・イノベーション」プログラム（GMSI）
「最先端融合科学イノベーション教育研究コンソーシアム」(CIAiS)

本件連絡先：　東京大学大学院　工学系研究科機械工学専攻　教授　金子成彦
GMSIプログラム事務局　E-mail: office@gmsi.t.u-tokyo.ac.jp　Phone: 03-5841-0696