

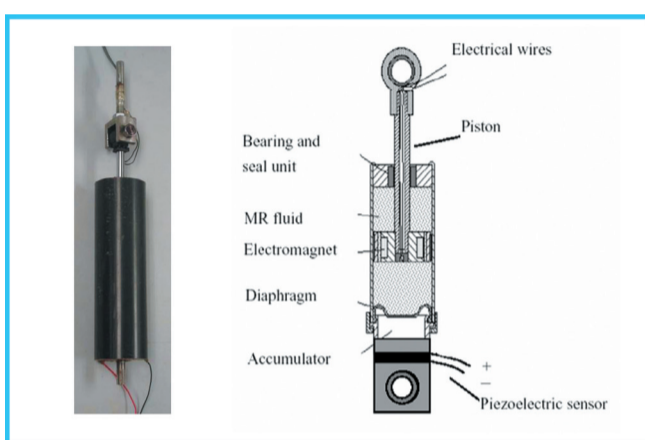
# 用於土木及機械工程結構之智能振動阻尼系統

## Smart Vibration Damping System for Intelligent Vibration Control of Civil and Mechanical structure

通過減少振動所致的結構失事和雜訊，提高安全與舒適度及結構可靠性。

Substantially improve the safety and comfort of human as well as the reliability of practicing structures by reducing vibrations, vibration-induced structural failures and vibroacoustically induced structural-bom noises.

來自香港理工大學應用物理學系以及土木及結構工程學系的聯合研究小組已經成功地研製了一種用於土木及機械工程結構的智能振動阻尼系統。該項新穎的創新系統包括一個智能傳感-作動阻尼器（具有內嵌式力感測器的振動阻尼器）以及與之相應的智慧控制電路，為減少土木及機械工程結構的振動以及振動所致的失事與雜訊而全面實施即時、閉環振動控制策略提供了一種簡便實用、經濟可靠的途徑。



A Smart Vibration Sensoridamper  
智能振動傳感-作動阻尼系統



系統測試與定標  
Test and Calibration of the smart system

A research team from the Department of Applied Physics and Department of Civil and Structural Engineering of the Hong Kong Polytechnic University has developed a smart vibration damping system for intelligent vibration control of civil and mechanical engineering structures. This novel and innovation system consists of smart vibration sensoridampers (i.e. vibration dampers with embedded force sensors) interfaced with intelligent control electronics to provide a simple, cost-effective and reliable means for full implementation of real-time, closed-loop vibration control strategies to mitigate structural vibrations and the resulting failures and associated noises.

### Principal Investigator

Prof. Derek Siu-wing OR  
Department of Electrical Engineering

### Contact Details

Institute for Entrepreneurship

Tel: (852) 3400 2929 Fax: (852) 2333 2410 Email: pdadmin@polyu.edu.hk

### 特色與優點

- 不需要外加力感測器
- 感測器與阻尼器的高度統一
- 即時阻尼作動與感應雙重功能
- 便捷地實施閉環控制策略
- 簡單實用，經濟可靠

### 應用

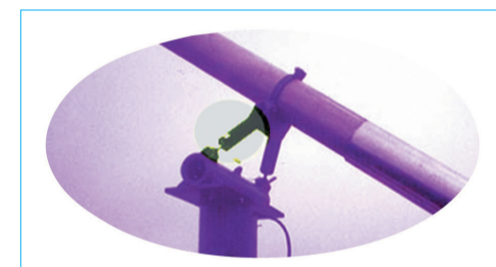
- 斜拉索的振動控制 - 例如用於在建的世界最長斜拉橋：主跨1088米的中國蘇通大橋和主跨1088米的香港昂船洲大橋
- 機車座椅以及懸掛系統的振動阻尼
- 自動化及精密儀器設備/車床的隔振

### 獎項

- 第九屆電流變與磁流變液國際學術會議唯一的磁流變液“最佳學生論文獎”（2005年9月）
- 第十五屆全國發明展銀獎（2005年9月）



系統應用於斜拉索的振動控制  
Application of the smart system to Vibration Control of the Stay Cables in a Cable-Stayed Bridge



### Special Features and Advantages

- No need to install external force sensors
- High degree of sensor-damper collocation
- Real-time force sensing-while-damping capability
- Ease of implementing closed-loop control strategies
- Simple, cost effective and reliable

### Applications

- Vibration control of the stay cables in cable-stayed bridges, specifically in the world's longest cable-stayed bridges under construction including 1) Stonecutters Bridge in Hong Kong with a main span of 1018m and 2) Sutong Bridge in China with a main span of 1088m
- Vibration damping of automotive seats and suspension system.
- Vibration isolate of automation and or precision equipment/ machines

### Awards

- The Best Student Research Paper, The 9th International Conference on Electro-Rheological (ER) Fluids and Magneto-Rheological Suspensions, Beijing (September 2005)
- Silver Award, the 15th China National Invention Exhibition (September 2005)