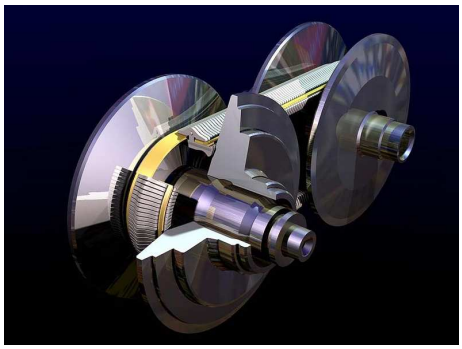
The Centre for Power Transmission and Motion Control

UNIVERSITY OF BATH

Research Project

SUBSTRUCTURAL TESTING AND CONTROL OF A CVT FOR OPTIMUM TRANSMISSION PERFORMANCE

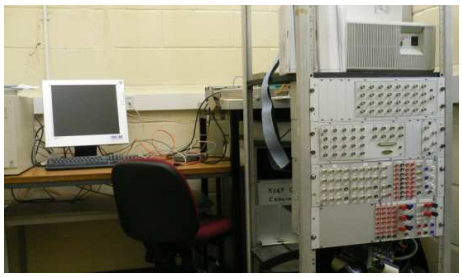


Motivation

The proposed research is to develop robust control strategies of continuously variable transmission (CVT) to optimize various performance criteria. The CVT will be tested in a substructure testing rig.

Research objectives

The research aims to develop robust control strategies for continuously variable transmissions (CVT) to optimize various performance criteria, with the focus on efficiency and driveability. To allow these strategies to be developed in the test cell, two technologies will be combined: substructure testing and Hardware In the Loop testing (HIL). Substructure testing isolates the component of interest from a large structure and uses dynamic models and actuators to emulate the rest of the system. The control techniques developed for substructure testing will be used to improve the dynamic fidelity of a two motor transmission test rig used for HIL testing of the CVT. Here, two dynamometers are used to replace the real engine and vehicle in the tests. dSPACE is employed to execute in real-time the computer models of the engine and road loads and send signals to dynamometers to emulate the engine and vehicle.



Future work

Robust control strategies for the actuators (dynamometers) will be developed first. They allow accurate motion tracking under unknown disturbances, which is essential for substructure testing. Then, the CVT will be tested on the substructure rig under different loads and a dynamic ratio change model will be identified in the frequency domain. A model estimation package has already been developed in MATLAB. Control methods will be derived to compensate the response lag and amplitude error observed in the test.

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