Abstract
Cornering weave oscillations associated with high performance motorcycles operating at high speeds, can be reduced by controlling the geometry of the rear suspension. A conventional monoshock rear suspension arrangement is modified and extended in a way that variations of the leverage ratio between the spring damper unit and road wheel are possible by an actuator. The actuator varies the geometry by controlling the displacement between two moving parts. The design analysis makes use of a high fidelity mathematical motorcycle model whose parameter set is based on a Suzuki GSX-R1000 sports machine. A displacement control strategy is developed based on classical Bode-Nyquist frequency response ideas. The controller further utilises an integrator anti-windup scheme to conform with the limited displacement space, and to limit the maximum actuator force and power requirements. Simulation results are presented to demonstrate that significant improvements can be obtained with an actuator of practical dimensions.

Biography: Simos Evangelou obtained an MEng degree from the University of Cambridge and a PhD from Imperial College. In January 2006 he was appointed to a joint lectureship between the Departments of Mechanical, and Electrical and Electronic Engineering at Imperial College, London. His research interests include car and motorcycle dynamics and control, modelling of multibody mechanical systems, application of control theory to mechanical systems, understanding and prevention of self-induced vibrations in mechanical systems such as road vehicles and aircraft landing gear, optimal driver behaviour and optimal tracking control, modelling and control of hybrid cars, variable geometry suspension systems.