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MECHANICS COLLOQUIUM

Stability Analysis of a Simple Walking Model

Driven by a Rhythmic Signal

Shinya Aoi

Dept. of Aeronautics and Astronautics,
Graduate School of Engineering,
Kyoto University, Kyoto, Japan.

Date : Friday 15 October 2004; time 15.00 – 15.45 pm

Location : Delft University of Technology,
Faculty of Mechanical Engineering and Marine Technology,
Mekelweg 2, Delft - Room D

Abstract:

In this study, we analyze dynamic properties of a simple walking model of a biped robot driven by a rhythmic signal from an oscillator. The model consists of a hip and two legs that are connected at the hip. The swing leg is controlled by the rhythmic signal that is open loop. We analyze the stability of the periodic walking motion by using a Poincaré map. The analysis reveals that the simple walking model has the self-stabilization property, that is, its walking motion asymptotically converges to a periodic walking motion without sensory feedback. Furthermore, the stability region of the model parameter values is clarified.

About the speaker:

Mr. Shinya Aoi received the B.S. and M.S. degrees from Kyoto University, Japan in 2001 and 2003, respectively. At present he is a Ph.D. student in the Department of Aeronautics and Astronautics, Graduate School of Engineering at Kyoto University in Kyoto, Japan, under the leadership of professor Kazuo Tsuchiya. Mr. Shinya Aoi has been studying the locomotion control of legged robots. In particular, he designed a control system using the ideas of the CPG (Central Pattern Generator) and using nonlinear oscillators.