THE FIELDS INSTITUTE

FOR RESEARCH IN MATHEMATICAL SCIENCES

SEMINAR SERIES ON CONTROL THEORY

SPEAKER: MIKE ENOS

The second in a series of four seminars on the topic

The Time-Optimal Problem for a Force-Free System of Two Symmetric Rigid Bodies in Three Space

will be held

Wednesday, October 23, 1991 at 3:30 p.m.

in

Davis Centre 2577
University of Waterloo

In this talk, we show that the mechanical system introduced last time is controllable. In particular, we will show that for any choice of endpoints in $SO(3)^2$, there is a piecewise-smooth motion of this system consisting of at most three successive motions during each of which the bodies rotate in opposite directions about a fixed axis.

We will prove this result by establishing the following statement for normalized quaternions: Given (λ_i, Λ_i), $i = 1,2$, there exist (γ_j, Γ_j), $1 \leq j \leq 3$, such that

$$(\gamma_3, \Gamma_3)(\gamma_2, \Gamma_2)(\gamma_1, \Gamma_1) = (\lambda_1, \Lambda_1)$$

and

$$(\gamma_3 - \Gamma_3)(\gamma_2 - \Gamma_2)(\gamma_1 - \Gamma_1) = (\lambda_2, \Lambda_2)$$