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**M.S. Seminar Talk 1**

Title: **Design Methodology of a novel Magneto-Rheological (MR) fluid based damper for Swing Phase Control of Above-Knee Prosthesis**

Speaker: **Mr Vivek Bafna (ME23S034)**

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Date and Time: **28-04-2026 @ 3:00 PM**

Venue: **412, Machine Design Section**

**Abstract**

MR (Magneto-Rheological) fluid based dampers are among the different types of swing phase control mechanisms deployed in above-knee prostheses to enable the transfemoral amputees to replicate the able-bodied swing phase behavior. However there are certain limitations associated with its structural configuration. To address these limitations, a novel MR damper is proposed which has improved design flexibility and potentially higher design conformability compared to the conventional types. Further, a first of its kind framework is developed to optimize the MR damper. The prosthetic limb and the MR damper are mathematically modelled and governing equations are derived. With the help of the obtained governing equation, MR damper design variables are optimized using genetic algorithm. The optimization results obtained are compared with another approach that aligns with existing work. The results indicate that a prosthesis built with the damper designed with proposed approach aligns better with the able-bodied swing phase behavior and consumes lesser energy.