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F-IVT Actuation System to Power Artificial Knee Joint

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Abstract : The efficiency of the actuation system of lower limb exoskeletons and of active orthoses is a significant aspect of the design of such devices because it affects their efficacy. F-IVT is an innovative actuation system to power artificial knee joint with energy recovery capabilities. Its key and non-conventional elements are a flywheel, that acts as a mechanical energy storage system, and an Infinitely Variable Transmission (IVT). The design of the F-IVT can be optimized for a certain walking condition, resulting in a heavy reduction of both the electric energy consumption and of the electric peak power. In this work, by means of simulations of level ground walking at different speeds, it is demonstrated how F-IVT is still an advantageous actuator, even when it does not work in nominal conditions.

Keywords : active orthoses, actuators, lower extremity exoskeletons, knee joint
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