Prof. Jozsef Kovecses:
Simulation Aspects and Challenges for Space Robotic Systems

Abstract: Contact tasks represent the most challenging elements of robotic operations. Simulation of such operations is a key element in space robotic applications and also sim-to-real transfer in reinforcement learning. Complex unilateral contact interfaces, friction, diversity of material properties are among the many contributors that make such robotic tasks extremely difficult to realistically reproduce in simulation and in virtual environments in general.

In this presentation, we describe and demonstrate simulation methods for such complex robotic systems and tasks in the context of space robotic operations. The techniques rely on the concept of system decomposition and real-time interfacing using co-simulation. We will introduce the concept of model-based coupling that can significantly enhance the performance and accuracy of real-time simulation.

Challenging space robotic contact tasks, such as grasping and insertion with jamming, will be used to illustrate the methods and their performance.