

# Differentiable simulation for robotics

*mercredi 18 juin 2025 10:30 (30 minutes)*

Simulation plays a crucial role in robotics research and development, as it provides a tremendous amount of data at a low cost, enabling the training, testing, and validation of various control algorithms. Many modern robotics algorithms, such as model predictive control or reinforcement learning, can significantly benefit from access to derivatives of system dynamics. Yet, traditional simulators do not provide this capability efficiently. We present Simple, a differentiable simulator explicitly designed for robotics applications. Simple demonstrates that computing derivatives of a system's dynamics can be achieved as fast as simulating the system itself, opening new possibilities for gradient-based optimization and learning in robotics.

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**Classification de Session:** Session 2