

# VORTRAG

## The Deterministic Impulse Control Maximum Principle in Operations Research: Necessary and Sufficient Optimality Conditions

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### Abstract:

Abstract: This paper considers a class of optimal control problems that allows jumps in the state variable. We present the necessary optimality conditions of the Impulse Control Maximum Principle based on the current value formulation. By reviewing the existing impulse control models in the literature, we point out that meaningful problems do not satisfy the sufficiency conditions. In particular, such problems either have a concave cost function, contain a fixed cost, or have a control-state interaction, which have in common that they each violate the concavity hypotheses used in the sufficiency theorem. The implication is that the corresponding problem in principle has multiple solutions that satisfy the necessary optimality conditions. Moreover, we argue that problems with fixed cost do not satisfy the conditions under which the necessary optimality conditions can be applied. However, we design a transformation, which ensures that the application of the Impulse Control Maximum Principle still provides the optimal solution. Finally, we show for the first time that for some existing models in the literature no optimal solution exists.