

## The Impact of the Number of Discrete Release Rates on Ramp Metering Performance

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### Abstract

Ramp metering, if properly applied, is a direct and efficient means to avoid or reduce the space-time extent of motorway congestion, along with a sensible improvement of the merging conditions. Regardless of the employed ramp metering algorithm, the metering signals may be operated in various ways based on the adopted ramp metering policy. Ramp metering policies include traffic signal cycle, 2- or  $n$ - cars per green, and discrete release rates. In the last policy, a number of discrete release rates is prespecified, each one implemented with a specific cycle and green phase. This approach allows for short green phases (small platoon releases) whenever possible, but allows also for high ramp flows when necessary. In this paper, the problem of determining the least necessary number of release rates that will not affect ramp metering operation compared to the theoretical case of any (even decimal) release rate, is addressed. Results from investigations by use of the ALINEA (Asservissement Linéaire d'entrée Autoroutière) ramp metering algorithm and the METANET (Modèle d'Écoulement du Trafic Autoroutier: NETwork) macroscopic traffic simulator are reported and discussed in detail. Finally, recommendations are provided concerning the least necessary number of release rates and the discretisation scheme to be used.