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Local Ramp Metering in the Presence of a Distant Downstream Bottleneck

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The paper addresses a macroscopic-simulation investigation on the performance of feedback local ramp-metering controller ALINEA and its PI (Proportional-Integral) extension for freeway stretches with a bottleneck at a distant location downstream of the metered on-ramp. The investigation indicates that the ramp metering performance of ALINEA (a simple controller with an Integral term) deteriorates in the distant downstream bottleneck case, while a significant improvement may be obtained by addition of a proportional term and by specification of suitable parameter values of the controller. The selected parameter values of the extended ALINEA regulator of the PI type are demonstrated to be suitable for a range of different bottleneck distances, which indicates that no fine-tuning would be necessary in field.