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A linear network with feedback and controls

Abstract

We consider a linear traffic network with successive sections of the road labelled $1, 2, \ldots, N$. Traffic entering at section i passes through all of the sections $j \geq i$ before leaving the network. This can be imagined as a model of a motorway into a city centre, where all traffic has a common final destination. The external traffic entering at each section passes through a ramp meter with an adjustable rate, and the rate at which traffic enters the queue for the ramp meter depends on the current delay in that queue. For this deterministic system, we find the ramp meter rates that minimise the maximum delay, describe features of the transient behaviour, and characterise the fixed point. This is joint work with Bill Helton, Frank Kelly, and Ruth Williams.