HEAVY AND LIGHT TRAFFIC IN FLUID MODELS WITH BURST ARRIVALS

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Abstract. We consider the problem of finding a heavy and light traffic limits for the steady-state workload in a fluid model having a continuous burst arrival process. Such a model is useful for describing (among other things) the packetwise transmission of data in telecommunications, where each packet is approximated to be a continuous flow. Whereas in a queueing model, each arrival epoch, t_n, corresponds to a customer with a service time S_n, the burst model is different: each arrival epoch, t_n, corresponds to a burst of work, that is, a continuous flow of work (fluid, information) to the system at rate 1 during the time interval $[t_n, t_n + S_n]$. In the present paper we show that the burst and queueing models share the same heavy-traffic limit for work, but that their behavior in light traffic is quite different.

Key words and phrases: Fluid model, queue, burst arrivals, heavy traffic, light traffic.