

The Fluid Limit of the Critical Processor Sharing Tandem Queue

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Abstract : A sequence of finite tandem queue is considered for this study. Each one has a single server, which operates under the egalitarian processor sharing discipline. External customers arrive at each queue according to a renewal input process and having a general service times distribution. Upon completing service, customers leave the current queue and enter to the next. Under mild assumptions, including critical data, we prove the existence and the uniqueness of the fluid solution. For asymptotic behavior, we provide necessary and sufficient conditions for the invariant state and the convergence to this invariant state. In the end, we establish the convergence of a correctly normalized state process to a fluid limit characterized by a system of algebraic and integral equations.

Keywords : fluid limit, fluid model, measure valued process, processor sharing, tandem queue

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