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A tandem fluid network with Lévy input. (English) [Zbl 0783.60089](#)

Bhat, U. Narayan (ed.) et al., Queueing and related models. Oxford: Clarendon Press. Oxf. Stat. Sci. Ser. 9, 112-128 (1992).

Summary: We introduce an open network fluid model with stochastic input and deterministic linear internal flows. In particular, we consider several buffers with unlimited capacity in series. The input to the first buffer is a nondecreasing stochastic process with stationary and independent increments. The content flows forward from buffer to buffer through connecting pipes at constant deterministic rates. We obtain simple expressions for the mean content of each buffer and each pipe by exploiting a connection to the classical single-node storage model with nondecreasing Lévy input and constant release rate. We obtain the marginal distributions describing the content of each buffer by exploiting a connection to a linear fluid model with random disruptions. We apply martingale theory to derive the joint distribution of the content of the first two buffers, which is not of product form. Finally, we show that the fluid network can be regarded as the limit of a sequence of conventional queueing networks.

For the entire collection see [\[Zbl 0771.00010\]](#).

MSC:

60K20 Applications of Markov renewal processes (reliability, queueing networks, etc.)

Cited in **14** Documents

Keywords:

open network fluid model; stochastic process with stationary and independent increments; single-node storage model; martingale theory; queueing networks