

# UNIQUENESS OF THE STATIONARY DISTRIBUTION OF THE DIFFUSION APPROXIMATION OF A MANY-SERVER QUEUE

**K. Ramanan**, Brown University, Rhode Island, USA, Kavita\_Ramanan@brown.edu

**M. Aghajani**, Brown University, Rhode Island, USA, mohammadreza\_aghajani@brown.edu

A three-state Markov process was shown to arise as the diffusion limit for a many-server queue in the Halfin-Whitt asymptotic regime by Kaspı and Ramanan. We identify a more tractable two-state representation of this process that is still Markov, and show that this Markov process has a unique stationary distribution. In addition, we show that this stationary distribution is the limit of stationary distributions of the scaled state processes associated with the  $N$ -server queues. Standard Harris recurrence methods are not applicable to prove uniqueness of the stationary distribution because the Markovian process is infinite-dimensional. Instead, the proof relies on an asymptotic coupling approach that is potentially of broader interest. Time permitting, we will also discuss generalizations.