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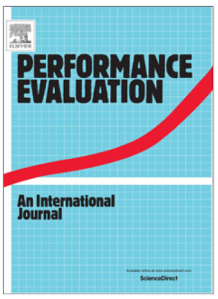

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Canonical representation of order 2 transient Markov and rational arrival processes[☆]

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Abstract

Similar to other processes that are modulated by background Markov chains the matrix representation of a transient Markov arrival process is not unique and the use of a convenient unique canonical form is essential for practical computations.

The paper presents a set of 5 Markovian forms which provide a unique and minimal representation for all members of the TMAP(2) class. In the course of the derivation we also show the identity of the TMAP(2) and the TRAP(2) classes.

Keywords: Transient Markov arrival process, canonical form, Transient rational arrival process.

1. Introduction

With the evolution of the complexity of stochastic models a new modelling paradigm arises recently on the field of point processes. Instead of defining processes of individual events, processes of a finite series of events are used when they better describe the occurrence of events. Such point processes have gained attention in various fields, e.g., demography [1], epidemiology [2], risk processes [3], port consumption modelling of web requests [4]. The following example demonstrates this modelling paradigm. *Assume that a single user browses web pages on the internet. A single click on a website initiates a process of downloading several embedded objects. To model the overall download process of objects it is a natural approach to separate the user's activity from the behaviour of the*

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