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► **To cite this version:**

Gerardo Rubino. Relations between irreducible and absorbing Markov chains. 2019 - Fall Western Sectional Meeting of the AMS, Nov 2019, Riverside, United States. pp.1. hal-02430373

HAL Id: hal-02430373

<https://inria.hal.science/hal-02430373>

Submitted on 8 Jan 2020

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Relations between irreducible and absorbing Markov chains

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Presentation in the Special Session SS 27A “Celebrating MM Rao’s Many Mathematical Contributions as he Turns 90 Years Old”, at the Fall Western Sectional Meeting of the AMS, Riverside, California, November 9–10, 2019.

Abstract

Irreducible Markov chains in continuous time are the basic tool for instance in performance evaluation (typically, a queuing model), where in a large majority of cases, we are interested in the behavior of the modeled system in steady-state. Most metrics used are based on the stationary distribution of the model, under unicity natural conditions. Absorbing Markov chains, also in continuous time, play the equivalent role in dependability evaluation, because realistic models must have a finite lifetime, which corresponds here to the absorption time of the chain. In this case, the object of interest is this lifetime, steady-state gives no useful information about the system, and most of the used metrics are defined based on that object. This talk will describe different connections between the two worlds together with some consequences of those relations in both areas, that is, both in performance and in dependability.