The Covariance Function of a Regenerative Process

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In this paper, we develop regenerative representations for the covariance function of both a non-delayed regenerative process and a stationary regenerative process. These results are used to obtain conditions under which the lag-t covariance vanishes as t → ∞, together with associated rates of convergence. The spectral density of a stationary regenerative process is then calculated explicitly in terms of quantities expressed over regenerative cycles. The paper concludes with an application of the theory developed here to the steady-state simulation problem.