

# PATH COUPLING WITHOUT CONTRACTION

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(joint work with Martin Dyer)

Path coupling is a useful technique for simplifying the analysis of a coupling of a Markov chain. Rather than defining and analysing the coupling on every pair in  $\Omega \times \Omega$ , where  $\Omega$  is the state space of the Markov chain, analysis is done on a smaller set  $S \subseteq \Omega \times \Omega$ . If the coefficient of contraction  $\beta$  is strictly less than one, no further analysis is needed in order to show rapid mixing. However, if  $\beta = 1$  then analysis (of the variance) is still required for all pairs in  $\Omega \times \Omega$ . We present a new approach which shows rapid mixing in the case  $\beta = 1$  with a further condition which only needs to be checked for pairs in  $S$ , greatly simplifying the work involved. We also present a technique applicable when  $\beta = 1$  and our condition is not met. This work appeared in *Journal of Discrete Algorithms*, 5:280-292 (2007).

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