Relation between cyclization of polymers with different initial conditions CHUCK YEUNG, School of Science, Penn State Erie, Erie, PA, BARRY FRIEDMAN, Dept. of Physics, Sam Houston State Univ, Huntsville, TX — We study cyclization of polymer chains in which the reactive ends of the chains are initially in close proximity (ring initial conditions). We find a surprising general relation between cyclization with ring and equilibrium initial conditions, namely that $\Phi_{ring}(t) \propto d\Phi/dt_{eq}$ where $\Phi(t)$ is the survival fraction. We show that this proportionality is exact for a special type of non-generic ring initial conditions and use an approximate argument to motivate the proportionality for more general ring initial condition. Our analytic results are confirmed by Langevin simulations of Gaussian chains. Earlier work for very long Rouse chains with equilibrium initial conditions show that $d\Phi/dt_{eq} \sim t^{-1/4}$ for times less than the longest polymer relaxation time. Therefore our relation shows that $d\Phi/dt_{ring} \sim t^{-5/4}$ for a ring initial distribution under the same conditions.

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