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The asymptotic behavior in a reversible random  
coagulation-fragmentation polymerization process with sub-exponential  
decay

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The asymptotic behavior of a reversible random coagulation-fragmentation polymerization process in the thermodynamic limit has been shown in this paper, with the number of distinct ways of forming a  $k$ -clusters from  $k$  units  $f(k)$

satisfying  $f(k) = (1 + o(1))k^{-\beta} \exp(-k^\alpha)r^{-k}$ , with  $0 < \alpha < 1$  and  $\beta > 0$ .

- (1) The largest length of polymers of size  $N$  in the subcritical stage
- (2) The distribution of small and medium clusters in subcritical stage and near-critical, supercritical stages.
- (3) The distribution of medium and large clusters in near-critical and supercritical stages.

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