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Title: *Terrorists never congregate in even numbers*

Abstract

We analyse a class of fragmentation-coalescence processes defined on finite systems of particles organised into clusters. Coalescent events merge multiple clusters simultaneously to form a single larger cluster, while fragmentation breaks up a cluster into a collection of singletons. Under mild conditions on the coalescence rates, we show that the distribution of cluster sizes becomes non-random in the hydrodynamic limit. Moreover, we discover that in the limit of small fragmentation rate these processes exhibit self-organised criticality in the cluster size distribution, with universal exponent 3/2. In addition, we observe a strange phenomenon that if coalescence of clusters always involves 3 or more blocks, then the thermodynamic limit has no even sided blocks. Some complementary results are also presented for exchangeable fragmentation-coalescence processes on partitions of natural numbers. In this case one may work directly with the infinite system and we ask whether the process can come down from infinity. The answer reveals a remarkable dichotomy.
This is based on two different pieces of work with Tim Rogers, Steven Pagett and Jason Schweinsberg