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Avoiding Small Subgraphs in Achlioptas Processes

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Consider the following generalization of the classical random graph process, known as the Achlioptas process. At each round, instead of receiving a single random edge, one receives two random edges and chooses one of them in a deterministic, online fashion. Note that the trivial decision strategy produces $G(n, M)$ after M rounds.

This process has been studied by many researchers, mainly in the context of delaying or accelerating the appearance of the giant component relative to its classical threshold in $G(n, M)$. In our work, we investigate the classical small subgraph problem for Achlioptas processes. That is, given a fixed graph H , we study whether there is a deterministic online algorithm that substantially delays the appearance of H as a subgraph. We determine thresholds for the avoidance of all cycles C_t , cliques K_t , and complete bipartite graphs $K_{t,t}$.

This is joint work with Michael Krivelevich and Benny Sudakov.