Excluded Grid Theorem: Improved and Simplified

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──── **Abstract** ────

One of the key results in Robertson and Seymour's seminal work on graph minors is the Excluded Grid Theorem. The theorem states that there is a function f, such that for every positive integer g, every graph whose treewidth is at least $f(g)$ contains the $(g \times g)$-grid as a minor. This theorem has found many applications in graph theory and algorithms. An important open question is establishing tight bounds on $f(g)$ for which the theorem holds. Robertson and Seymour showed that $f(g) \geq \Omega(g^2 \log g)$, and this remains the best current lower bound on $f(g)$. Until recently, the best upper bound was super-exponential in g. In this talk, we will give an overview of a recent sequence of results, that has lead to the best current upper bound of $f(g) = O(g^{19} \operatorname{poly} \log(g))$. We will also survey some connections to algorithms for graph routing problems.