



复旦大学数学科学学院 数学综合报告会

报告题目: Some recent results for sphere covering of high-dimensional Euclidean spaces

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报告摘要:

In this talk, we discuss two recent developments concerning sphere covering problems in high-dimensional Euclidean spaces. The first result improves the classical upper bound for lattice coverings by equal spheres: a new construction achieves density $\mathcal{O}(n \log^\beta n)$ with $(\beta \approx 1.858)$, improving Rogers' 1959 bound $\mathcal{O}(n \log^\alpha n)$ with $(\alpha \approx 2.047)$. The second result concerns random coverings by translates of convex bodies. For unit balls, it is shown that one can attain the best known asymptotic density $((1/2 + o(1)) n \ln n)$ while simultaneously reducing the maximum overlap multiplicity to $(1.79556 n \ln n)$, improving a classical bound of Erdős--Rogers. Furthermore, the work demonstrates intrinsic limitations of the standard random periodic method, which cannot achieve densities below $((1/2 + o(1)) n \ln n)$ for any convex body, and identifies cubes as extremal cases with especially poor random covering performance.

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