

# 数学与系统科学研究院

## 计算数学所学术报告

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报告题目:

**Non-smooth Optimization Method  
for VLSI Global Placement**

邀请人: 优化与应用研究中心

报告时间: 2015 年 7 月 4 日 (周六)

上午 11:00-11:40

报告地点: 数学院南楼二层

219 会议室

## **Abstract:**

The common objective of very large-scale integration (VLSI) placement problem is to minimize the total wirelength, which is calculated by the total half-perimeter wire-length (HPWL). Since the HPWL is not differentiable, various differentiable wirelength approximation functions have been proposed in analytical placement methods. In this talk, we reformulate the HPWL as an  $l_1$ -norm model of the wirelength function, which is exact but nonsmooth. Based on the  $l_1$ -norm wirelength model and exact calculation of overlapping areas between cells and bins, a nonsmooth optimization model is proposed for the VLSI global placement problem, and a subgradient method is proposed for solving the nonsmooth optimization problem. Moreover, local convergence of the subgradient method is proved under some suitable conditions. In addition, two enhanced techniques, i.e., an adaptive parameter to control the step size and a cautious strategy for increasing the penalty parameter, are also used in the nonsmooth optimization method. In order to make the placement method scalable, a multilevel framework is adopted. In the clustering stage, the best choice clustering algorithm is modified according to the  $l_1$ -norm wirelength model to cluster the cells, and the nonsmooth optimization method is recursively used in the declustering stage. Comparisons of experimental results on the International Symposium on Physical Design (ISPD) 2005 and 2006 benchmarks show that the global placement method is promising.

# 欢迎大家参加！