

数学与系统科学研究院

计算数学所学术报告

报告人: 谭光明 研究员

( 中科院计算技术研究所 )

报告题目:

**Design and Implementation of  
Adaptive SpMV Library for  
Multicore and Manycore  
Architecture**

邀请人: 崔涛 副研究员

报告时间: 2017 年 5 月 9 日 (周二)

上午 10:00-11:00

报告地点: 数学院南楼七层

702 教室

## **Abstract:**

**Sparse matrix vector multiplication (SpMV) is an important kernel in both traditional high performance computing and emerging data-intensive applications. Previous SpMV libraries are optimized by either application-specific or architecture-specific approach, and they're complicated to be used in real applications. In this work we develop an auto-tuning system (SMATER) to bridge the gap between specific optimizations and general-purpose use. SMATER provides programmers a unified interface based on the compressed sparse row (CSR) format by implicitly choosing the best format and the fastest implementation for any input sparse matrix in the runtime. SMATER leverages a machine learning model and a retargetable backend library to quickly predict the best combination. Performance parameters are extracted from 2386 matrices in UF sparse matrix collection. The experiments show that SMATER achieves the impressive performance while being portable on the state-of-the-art x86 multi-core processors, NVIDIA GPU and Intel Xeon Phi accelerators. Compared with Intel MKL library, SMATER runs faster by more than 3 times. We demonstrate its adaptivity in an algebraic multigrid solver from hypre library and report above 20% performance improvement.**

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