

数学与系统科学研究院

计算数学所短期课程

报告人: **Prof. Dr. Ludmil Zikatanov**

(*Penn State University, University Park, USA*)

报告题目:

MULTIGRID METHODS AND APPLICATIONS

邀请人: 张晨松 副研究员

报告时间:

- I. 2015年8月5日 (周一) 上午9:00-12:00
- II. 2015年8月6日 (周三) 上午9:00-12:00
- III. 2015年8月7日(周四)上午9:00-12:00

报告地点: 科技综合楼三层

311 报告厅

Topic:

Prof. Dr. Ludmil Zikatanov (Penn State University, University Park, USA) will give a short course on multigrid methods and their applications at the State Key Laboratory of Scientific and Engineering Computing (LSEC) in 2015. Prof. Zikatanov is a well-known expert in multilevel iterative methods, especially in geometric and algebraic multigrid methods. The short course will cover the following topics:

- 1. Basic facts from linear algebra. Stationary iterative methods.**
- 2. The two-grid method and its convergence rate.**
- 3. Subspace corrections theory. Main convergence theorem.**
- 4. Introduction to basic graph theory.**
- 5. Algebraic multigrid (AMG) methods: Coarse spaces, interpolation and convergence.**
- 6. Convergence theory for the smoothed aggregation AMG.**
- 7. Auxiliary space method and uniform preconditioning.**
- 8. Multigrid methods for convection-diffusion problems.**
- 9. A subspace correction method for eigenvalue problems on graphs.**
- 10. Applications of subspace correction methods to spectral graph drawing.**

References

- [1] Jinchao Xu. Iterative methods by space decomposition and subspace correction. *SIAM Rev.*, 34(4):581–613, 1992.
- [2] Jinchao Xu and Ludmil Zikatanov. The method of alternating projections and the method of subspace corrections in Hilbert space. *J. Amer. Math. Soc.*, 15(3):573–597, 2002.
- [3] Panayot S. Vassilevski. Multilevel block factorization preconditioners. Springer, New York, 2008. Matrix-based analysis and algorithms for solving finite element equations.
- [4] Panayot S. Vassilevski. Lecture notes on multigrid methods. Technical Report LLNL-TR-439511, Lawrence Livermore National Laboratory, July 1 2010. Available at <http://people.llnl.gov/vassilevskil>.

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