第 31 回先進スーパーコンピューティング環境（ASE）研究会実施報告

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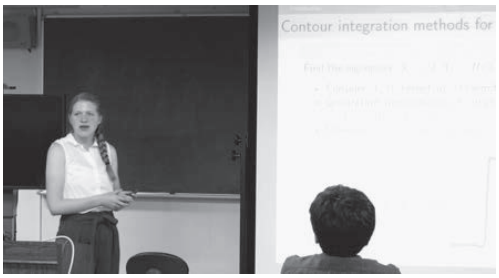
東京大学情報基盤センターASE 研究会（Advanced Supercomputing Environment）は，内外からの講演者を招いて不定期に開催している。2017 年 9 月 20 日（水）に実施された第 31 回 ASE 研究会[1]では，ドイツの Wuppertal 大学より Martin Galgon 氏ならびに Sarah Huber 氏を招き，超並列計算機上で動作する固有値解析ソフトウェアフレームワーク：BEAST の関連研究について，ご講演いただいた。合計 7 名の出席者があり，活発な議論が行われた。



写真：講演する Galgon 氏(左)と Huber 氏(右)

時間帯	講演者	題　目
13:30-13:35	Akihiro Ida (ITC, The University of Tokyo)	Welcome & Opening
13:35-14:15	Martin Galgon (University of Wuppertal)	Meet the BEAST
ABSTRACT: With the foreseeable advent of exascale super computers, adapting algorithms and software to the new hybrid-parallel infrastructures becomes inevitable. The ESSEX project (Equipping Sparse Solvers for Exascale), a part of the Priority Programme "Software for Exascale Computing" (SPPEXA), develops and investigates programming concepts and numerical algorithms for scalable, efficient and robust iterative sparse matrix applications on exascale systems. Within the project, the group of Bruno Lang from the University of Wuppertal, Germany, focuses on projection based iterative eigensolvers to tackle large scale sparse Hermitian eigenproblems in standard and generalized form, using an expanded implementation of the FEAST method and Chebyshev filter diagonalization (ChebFD) that adds improvements and provides new features, named BEAST. We provide an introduction to some of the fundamental ideas behind the main features of the BEAST eigensolver.		
14:20-15:00	Sarah Huber (University of Wuppertal)	Reducing linear system size with moment based methods in the BEAST framework
Abstract: Contour-integral based methods for interior eigenvalue problems have proven very effective. The most expensive part of these algorithms is the solution of linear systems with large numbers of right hand sides. So far, our BEAST framework has considered one such contour-integral based scheme, FEAST, but we have now extended it to include moment based methods; namely Sakurai-Sugiura methods. We consider how performance may be improved through the use of moments with a constrained subspace size to reduce the number of right hand sides in these systems, which is a critical parameter for the cost of such integral based schemes. The iterative nature of the resulting solver is well suited to the BEAST framework, allowing us to adjust parameters during computation for further cost reduction. Numerical results show that these algorithmic considerations lead to a noticeable reduction in time for the solver.		

[1] http://www.cc.u-tokyo.ac.jp/event/ase/31.html