ADAPTIVE BOUNDARY ELEMENT METHOD: CONVERGENCE AND OPTIMALITY FOR STANDARD DISCRETIZATIONS

MICHAEL FEISCHL AND DIRK PRAETORIUS

Whereas convergence of adaptive finite element methods (AFEMs), even with optimal rates, is fairly well understood for standard discretizations (e.g. piecewise polynomials) since the seminal works [BDD04, Ste07, CKNS08], the theory for adaptive boundary element methods (ABEMs) is less developed. Only very recently, [FKMP13, Tso13] proved convergence with optimal rates for ABEM with the weighted residual error estimator from [CMS01] and the standard adaptive loop

$$\boxed{\texttt{solve}} \longrightarrow \boxed{\texttt{estimate}} \longrightarrow \boxed{\texttt{mark}} \longrightarrow \boxed{\texttt{refine}}$$

In this talk, we present the axiomatic approach to rate optimality of adaptive algorithms from [CFPP14] and discuss the recent results and the state of the art of ABEM. Moreover, we discuss the main ideas in the optimality proof of [FKMP13] as well as several extensions, which may be of independent interest.

References

[BDD04] Peter Binev, Wolfgang Dahmen, and Ronald DeVore. Adaptive finite element methods with convergence rates. *Numer. Math.*, 97(2):219–268, 2004.

[CFPP14] C. Carstensen, M. Feischl, M. Page, and D. Praetorius. Axioms of adaptivity. *Comput. Math. Appl.*, 67(6):1195–1253, 2014.

[CKNS08] J. Manuel Cascon, Christian Kreuzer, Ricardo H. Nochetto, and Kunibert G. Siebert. Quasi-optimal convergence rate for an adaptive finite element method. *SIAM J. Numer. Anal.*, 46(5):2524–2550, 2008.

[CMS01] Carsten Carstensen, Matthias Maischak, and Ernst P. Stephan. A posteriori error estimate and h-adaptive algorithm on surfaces for Symm's integral equation. *Numer. Math.*, 90(2):197–213, 2001.

[FKMP13] Michael Feischl, Michael Karkulik, J. Markus Melenk, and Dirk Praetorius. Quasi-optimal convergence rate for an adaptive boundary element method. *SIAM J. Numer. Anal.*, 51:1327–1348, 2013.

[Ste07] Rob Stevenson. Optimality of a standard adaptive finite element method. *Found. Comput. Math.*, 7(2):245–269, 2007.

[Tso13] Gantumur Tsogtgerel. Adaptive boundary element methods with convergence rates. *Numerische Mathematik*, 124(3):471–516, 2013.

Institute for Analysis and Scientific Computing, Vienna University of Technology,, Wiedner Hauptstrae 8-10, 1040 Vienna, michael.feischl@tuwien.ac.at, dirk.praetorius@tuwien.ac.at