Title: Convergence of the Restricted Additive Schwarz method with impedance boundary conditions for the Helmholtz equation.

Abstract: The Restricted Additive Schwarz method with impedance transmission conditions on subdomains (sometimes called the ORAS method) is an overlapping domain decomposition method which can be used as an iterative solver or as a preconditioner for solving discretized Helmholtz boundary-value problems. It forms the fundamental onelevel method for several large scale solvers. In the talk we present a novel convergence analysis for this method. Themain components of the talk are: (i) ORAS is a nonconforming finite element approximation of a classical parallel Schwarz method, formulated at the PDE level; (ii) The parallel Schwarz method is power contractive for domain decompositions of `strip-type' and is observed to be power contractive for general domain decompositions in 2D experiments; (iii) Working in suitable Helmholtzharmonic finite element spaces, the ORAS method is proved to enjoy the same convergence estimates as the parallel Schwarz method; in particular its power contractive property is independent of mesh size (small enough) and of the polynomial order of the finite element spaces used.

The work on ORAS is recent joint work with Shihua Gong and Euan Spence (Bath) while the results on the parallel Schwarz method were obtained with Shihua Gong, Martin Gander (Geneva), David Lafontaine (Bath) and Euan Spence.