

Modern Coarse Spaces in Domain Decomposition II

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Abstract

This is the follow-up of **Modern Coarse Spaces in Domain Decomposition I**, presented by Martin J. Gander. In this presentation I will concentrate on the mathematical analysis of the iteration map for the Schwarz algorithm with Dirichlet or Robin transmission conditions, with crosspoints. I will give an unified framework for the modal analysis of the map, using separation of variables. The eigenfrequencies are roots of an entire function that will be analyzed in detail. The eigenmodes are the masterpieces for a two-level method, with a specially optimized Robin parameter. Though the analysis relies on a special domain decomposition into squares, I will show with numerical experiments the power of the method applied to a Metis decomposition.

References

- [1] Francois Cuvelier, Martin J. Gander and Laurence Halpern. Fundamental coarse space components for Schwarz methods with crosspoints, Domain Decomposition Methods in Science and Engineering XXVI, LNCSE, Springer-Verlag, 2021.

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Laurence Halpern is professor emeritus at the University Sorbonne-Paris-Nord, where she has been a professor since 1988.

She received her PhD in numerical analysis at Ecole Polytechnique (France) in 1980, on *absorbing boundary conditions for the discretization of the wave equation*. Then she worked for a few years as CNRS- junior researcher at Ecole Polytechnique, before becoming a full professor at Université Sorbonne Paris Nord, aged 33.

She has been working on absorbing boundary conditions ever since, with various co-authors, in particular B. Engquist (Ices, Texas, US), L.N. Trefethen (Oxford, GB), J.B. Rauch (Ann Arbor, Michigan, US).

She started studying domain decomposition in the 90's, and more precisely optimized waveform relaxation methods. A large part of her activity in this field is joint work with M. Gander, and several colleagues around the world, PhD students, which were supported by institutional grants, or ANR (french research agency) grants.

Laurence Halpern entered the scientific committee of ddm.org in 2008, and became a chair in 2019. She has been servicing in several french or european institutions, being chair of her department, member of the research committee of her university, member of the executive committee of the EMS (european math society).

More precisions on her activity <https://www.math.univ-paris13.fr/~halpern/>