

# Robust Coarse Space Construction for Optimized Domain Decomposition Methods

Ryadh Haferssas <sup>\*1</sup>, Pierre Jolivet <sup>†1</sup> and Frédéric Nataf <sup>‡1</sup>

<sup>1</sup>Laboratoire J.L. Lions, CNRS UMR 7598, Alpines Inria team and UPMC, Paris, France

Optimized Schwarz methods (OSM) are very popular methods which were introduced by P.L. Lions for elliptic problems and by B. Despres for propagative wave phenomena. One drawback was the lack of theoretical results for variable coefficients problems and overlapping decompositions. We build here a coarse space for which the convergence rate of the two-level method is guaranteed regardless of the regularity of the coefficients. We do this by introducing a symmetrized variant of the ORAS (Optimized Restricted Additive Schwarz) algorithm by A. St Cyr et al. and by identifying the problematic modes using two different generalized eigenvalue problems instead of only one as for the ASM (Additive Schwarz method), BDD (balancing domain decomposition) or FETI (finite element tearing and interconnection methods).

---

\*ryadh.haferssas@ljl.math.upmc.fr

†pierre.jolivet@ljl.math.upmc.fr

‡nataf@ann.jussieu.fr