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Towards an efficient domain decomposition solver for industrial time-harmonic flow acoustics

Philippe Marchner[1,2,3,*], Hadrien Bériot[1], Xavier Antoine[2], and Christophe Geuzaine[3].

[1] Siemens Industry Software SAS, 92320 Châtillon, France,
philippe.marchner@siemens.com
[2] Université de Lorraine, CNRS, Inria, IECL, 54000 Nancy, France
[3] Université de Liège, Institut Montefiore B28, 4000 Liège, Belgium

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The design of an efficient parallel solver for time-harmonic high-frequency wave problems remains a difficult computational challenge. The aim of this talk is to present some recent advances concerning the non-overlapping quasi-optimal Schwarz domain decomposition method [1]. In particular, we extend the design of suitable transmission boundary conditions to time-harmonic problems in the presence of strong mean flow anisotropy with spatially varying coefficients, inspired by techniques coming from absorbing boundary conditions [2]. These transmission boundary conditions are next implemented in a high-order finite element solver and validated on academic problems. We also report some numerical results on a large scale industrial problem [3] at high frequency to assess the parallel scalability of the domain decomposition solver. Finally, we conclude by giving some perspectives, in particular regarding how to obtain a better scalability of the algorithm.

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