# On the Schwarz Alternating Procedure with a Polynomial Preconditioning Conjugate Gradient.

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**Abstract**

In this study we will focus on the performance of the Schwarz alternating procedure with the use of the polynomial preconditioning conjugate gradient method, as an internal solver, to solve the linear system generated from the discretization of the self adjoint problem, defined over an overlapped domains by the explicit group 2 of a five molecular scheme and the generated linear sytem for each overlapped domain is of a sparse block structure, $A^{\pi}$ property and $\pi$ consistently ordered.

The considered discretization for the self adjoint problem was successfully performed with 5 or 9 molecular schemes to solve the generated linear system using the PCG algorithm, but in this study the preconditioning of the CG is defined by a polynomial preconditioning by performing few inner iterations according to Eisenstant's procedure set up by a vectorizable SSOR preconditioning with different consideration of the diagonal entries.

For comparison purpose a couple of model problems are considered with a various size of overlapping domain $\Omega_1$ and $\Omega_2$, ranging from $h$ to almost a complete overlapping .