Title: AWG, an algebraic solver for symmetric positive definite problems

Abstract: A new coarse space is introduced for symmetric positive definite linear systems. It is called AWG (for Algebraic-Woodbury-GenEO) and constructed algebraically: only the knowledge of the matrix A for which the linear system is being solved is required.
Thanks to the GenEO spectral coarse space technique, the condition number of the preconditioned operator is bounded theoretically from above. This upper bound can be made smaller by enriching the coarse space with more spectral modes.
The novelty is that, unlike in previous work on the GenEO coarse spaces, no knowledge of a partially non-assembled form of A is required. Indeed, the spectral coarse space technique is not applied directly to A but to a low-rank modification of A of which a suitable non-assembled form is known by construction. The extra cost is a second (and to this day rather expensive) coarse solve in the preconditioner.