5007-15-370 **Juan Carlos Cabral Figueredo*** (jccabral19@gmail.com), Avda. Mcal. Lopez, Campus Universitario UNA, 2111 SL San Lorenzo, Central, Paraguay, and **Christian Schaerer** (cschaer@pol.una.py), Avda. Mcal. Lopez, Campus Universitario UNA, 2111 SL San Lorenzo, Central, Paraguay. *Harmonic Ritz control strategy for restarting GMRES(m).*

The Generalized Minimal Residual method is normally used for the solution of large, sparse and nonsymmetric linear systems of equations $Ax = b$. In practice, the restarted GMRES method denoted as GMRES(m) is used to reduce storage and orthogonalization costs. However, if an appropriate m is not chosen, the convergence of GMRES(m) is not guaranteed, and the method may present stagnation or slow convergence.

In the restarting strategy important information of the Krylov subspace is lost, hence the resulting subspace $\mathcal{K}_m(A, b)$ may not be rich enough to guarantee the quality of the solution. To enrich the subspace we propose the combination of two techniques. Firstly, approximate harmonic Ritz eigenvectors associated with the smallest harmonic Ritz eigenvalues are added to $\mathcal{K}_m(A, b)$. Secondly, GMRES(m) method is formulated as a control problem and m chosen adaptively at each cycle. The advantage of this combination is that only a few additional vectors need to be stored and the controller has the capability to modify the dimension of the Krylov subspace if any convergence problem is detected. Numerical experiments show that the control inspired Ritz-GMRES(m) has good convergence and robustness than others adaptive methods. (Received May 15, 2013)