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**Inheritance of spectral equivalence in algebraic multilevel
methods**

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In this talk we consider the inheritance of different types of spectral equivalence in algebraic multilevel methods.

In detail we obtain a two level preconditioner

$$C_{2L} = \begin{bmatrix} D^{-1} + D^{-1}A_{12}S^{-1}A_{21}D^{-1} & -D^{-1}A_{12}S^{-1} \\ -S^{-1}A_{21}D^{-1} & S^{-1} \end{bmatrix} \quad (1)$$

for a symmetric positive definite matrix

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}.$$

Here D and S are approximations of A_{11} and $A_{22} - A_{21}D^{-1}A_{12}$ respectively.

In the talk we assume that D and S have some spectral property related to A_{11} and $A_{22} - A_{21}D^{-1}A_{12}$ respectively and show that C_{2L} defined by (1) has the same property related to A .

This leads also to new condition number bounds for two level methods applied as preconditioner.

These can be used to obtain new bounds for the multilevel preconditioner and the so called *AMLI* preconditioner

At the end of the talk we will see that for specific C.B.S. constants the new bounds improve well-known bounds.