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ON ALGEBRAIC MULTILEVEL METHODS FOR NON-SYMMETRIC SYSTEMS - CONVERGENCE RESULTS*

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Abstract. We analyze algebraic multilevel methods applied to non-symmetric M-matrices. Two types of multilevel approximate block factorizations are considered. The first one is related to the AMLI method. The second method is the multiplicative counterpart of the AMLI approach which we call the multiplicative algebraic multilevel (MAMLI) method. The MAMLI method is closely related to certain geometric and algebraic multigrid methods, such as the AMGr method. Although these multilevel methods work very well in practice for many problems, not much is known about theoretical convergence properties for non-symmetric problems. Here, we establish convergence results and comparison results between AMLI and MAMLI multilevel methods applied to non-symmetric M-matrices.

Key words. algebraic multilevel methods, multilevel approximate block factorizations, algebraic multigrid methods, AMLI method

AMS subject classifications. 65F10, 65F50, 65N22

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