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A Full Multigrid Method for Linear Complementarity Problems arising from Elastic Normal Contact Problems

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This paper presents a full multigrid (FMG) method, which combines a multigrid method, an active set algorithm and a nested iteration technique, to solve a linear complementarity problem (LCP) modeling elastic normal contact problems. The governing system in this LCP is derived from an integral equation and its coefficient matrix is dense, symmetric and block Toeplitz. An efficient and accurate initial guess of pressures and contact area is provided by the FMG method. One multigrid cycle is applied to solve this system approximately in each active set iteration. The results of our numerical experiments indicate that, on the one hand, one multigrid cycle is sufficient to obtain a satisfactory active set, and, on the other hand, our method can reduce the number of matrix-vector products and hence reduce the computational time to a great extent, compared to the original active set algorithm "NORM" developed by Kalker and implemented in his CONTACT software.