An Efficient Algorithm for the Dynamic Analysis of Periodic Structures

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An efficient algorithm for computing the dynamic responses of periodic structures is proposed. When applying the Newmark method for the large-scale dynamic systems, the key issue is to solve a system of linear algebraic equations efficiently. By using the symmetric property of the periodic structure, the group theory and the Woodbury formula, the linear algebraic equations corresponding to the periodic structures for the Newmark method can be decoupled into block forms and so can be solved efficiently. The proposed algorithm has the same precision as the Newmark method, but is more efficient and memory saving.

Keywords: Periodic structures, Group theory, Woodbury formula, dynamics