1. Substructure Synthesis Method using Dynamic Reduction

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When we apply the finite element method for the complicated and the huge structures, we should increase the number of elements to get more accurate results. Furthermore, it causes the increase of the degree of freedom and the limitation of calculating time and memory capacity of computer. So, many researchers have challenged to find more improved modeling techniques and calculation methods to overcome those hurdles. The Guyan's reduction method and the substructure synthesis method are typical examples of such methods. Of the substructure synthesis method, the component mode synthesis method(CMS) is widely used for dynamic analysis of structure. However, as order of natural frequency becomes higher, it causes errors because it implies the Guyan's static reduction and the number of modes taken from each component is deficient.

In this thesis, the substructure synthesis method using dynamic reduction is proposed to obtain accurate results in high order natural frequency range.

Computer simulation of the proposed method, FEM, and the component mode synthesis method(CMS) have been carried out on a rectangular plate to prove the availability of the proposed method.

The results are as follows :

1. The analytical results of the substructure synthesis method using dynamic reduction coincide with those of FEM, and the availability of the proposed method has been verified.
2. The proposed method can overcome the error occurrence which were caused by the defects of the component mode synthesis method using Guyan's static reduction.
3. The natural frequency of the specific frequency range can be obtained without errors. So, it is expected that the proposed method could be applied to the analysis in high frequency range like noise problem.