컴플라이언스 패턴기반 유전자 알고리즘을 이용한 위상최적설계

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Topology Optimization Using Compliance Pattern Based Genetic Algorithm

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Key Words: Topology Optimization(위상최적설계), Genetic Algorithm(유전자 알고리즘), Compliance Pattern(컴플라이언스 패턴)

Abstract : Topology Optimization is to find the optimal material distribution of the specified design domain minimizing the objective function while satisfying the design constraints. Since the genetic algorithm (GA) has its advantage of locating global optimum with high probability, it has been applied to the topology optimization. To guarantee the structural connectivity, the concept of compliance pattern is proposed and to improve the convergence rate, small number of population size and variable probability in genetic operators are incorporated into GA. The rank sum weight method is applied to formulate the fitness function consisting of compliance, volume, connectivity and checkerboard pattern. To substantiate the proposed method design examples in the previous works are compared with respect to the number of function evaluation and objective function value.

유한요소해석과 실험을 통한 반도체칩의 변형예측

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Prediction of Warpage of Semiconductor Chip via Experiment and Finite Element Analysis

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Key Words : Warpage(변형), Patterning layer(패턴층), Moisture effect(수분효과)

Abstract : Prediction of warpage and residual stress in semiconductor chip devices play an important role in chip design. However, there are a few uncertainties in warpage prediction due to unknown patterning material properties, and moisture effect on polymer film. To estimate patterning material properties, we adopt a composite plate analysis and experimental techniques. and measure the warpage of chip after drying at about 250°C for 30min to remove moisture. In 100um, 80um chip cases, finite element analysis result shows a good agreement with measured values, but for 50um and 60um chip cases, there exist a substantial deviation from the measured values due to local deformation from imperfection and defects inherently embedded in the patterning layer and nonuniform bonding between PIcoating and silicon.