전역최적화기법을 이용한 2차원익형의 다목적 최적화기

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Optimization of 2 Dimensional Airfoil Using Multi-objective Genetic Algorithm

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Key Words: Multi-objective (다목적), Bezier curve(Bezier 곡선), Optimization(최적화), Genetic Algorithm(유전알고리즘), Airfoil(날개형상), Pareto sets(파레토 집합)

Abstract : Shape optimization of airfoil has been performed for incompressible viscous flow. In this study, Pareto sets being global and non-dominated can be obtained by using the multi-objective genetic algorithm. NACA0012 airfoil , a baseline model, is parameterized and rebuilt with four-Bezier curves. Bezier curves are composed of five and four control points which are represented a leading edge and a tailing edge, respectively. There are eighteen design variables and two objectives; the lift and drag coefficients. After fifteen evolutions, the Pareto individuals of twenty can be achieved. One Pareto being the best for reduction of drag force improves its drag to 13%. Another Pareto, however, focusing on increasing the lift force, can improve its lift force to 61%, while sustaining its drag force, compared to those of baseline model.

Membrane Pumping을 이용한 Nano Fountain-Pen의 수치적 연구

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Numerical Study of Nano Fountain-Pen Using Membrane Pumping

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Key Words: Nano Fountain-Pen(나노 파운틴펜), Membrane Pumping(박막 펌핑), Micro Patterning(미세 패터닝)

Abstract : Nano fountain-pen is a novel device to make the constant patterning in micro process using new designed probe. Fountain-pen nanolithography (FPN) is applied for constant supply of liquid in conjunction with local correction of patterns and surface variation in the micro process. Many studies for FPN are going on. Type of traditional probes is the multi-tip which can pattern by sub-micro unit. In this study, nano fountain-pen is made up reservoir, micro channels, tip and secondary chamber. Instead of traditional method only using capillary force, liquid can definitely and exactly inject with membrane pumping by repulsive force of tip. It is difficult to perform a experiments in the micro range so that we carried out a new analysis for internal flow of nano fountain-pen with the membrane pumping. Using a commercial code, FLUENT, velocity, pressure and flow rate are obtained under laminar, unsteady and no-slip condition.