스프링 블록 모델에 의한 평면 링크기구의 자동 설계기법

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Automatic Synthesis of Planar Linkage Mechanism by a Sprung Block Model

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Key Words: Mechanism Design(기구 설계), Optimization(최적화)

Abstract : Linkage mechanisms are most common motion-converting devices. In traditional linkage design practice, a specific linkage type such as a four- or six-bar linkage is first selected and then its joint locations and link lengths are varied until a desired linkage is found. In this approach, the selection of the initial linkage configuration would require many trials and errors unless the designer is well experienced. The objective of this research is to establish a so-called automatic mechanism synthesis method that determines not only the linkage type but also linkage dimensions during the synthesis process. After investigating several modeling possibilities, we developed an equivalent planar linkage model composed of a set of rigid rectangular blocks connected to each other by stiffness-varying springs. If necessary, link mechanism is further tuned by using shape optimization.

자기베어링을 이용한 컴프레서 서지 압력 측정부 피드백 제어

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A Pressure Measurement Feedback Control of the Compressor Surge with a Magnetic Bearing Actuator

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Key Words: compressor surge(컴프레서 서지), output feedback control(출력부 피드백 제어), magnetic bearings(자기 베어링) and tip clearance modulation(팁 간격 조절)

Abstract : Although the mass flow measurement is theoretically the best choice for compressor instability control, proportional controls of the pressure measurement were widely used for practical reason. This paper presents a pressure measurement feedback control of the compressor surge using tip clearance actuation of a magnetic bearing actuator. First, we derive a mathematical model of tip clearance effect on the compressor pressure rise. Then, we simulate stabilizing mass flow measurement and state feedback controls. Then, an extended Kalman filter is designed to estimate the mass flow through measuring the compressor pressure, and finally, the output feedback control is designed through combining the feedback control and the EKF. Several simulations were performed based on the compressor data from a commercial turbocharger.