이진 매니퓰레이터의 역기구학 해석을 위한 연속 변수공간 최적화 방법 연구

남상준†(서울대) · 장강원*(군산대) · 김윤영**(서울대)

The Optimization Methodology in a Continuous Variable Space for the Inverse Kinematics of Binary Manipulators

Sang Jun Nam, Gang-Won Jang and Yoon Young Kim

Key Words: Binary manipulator(이진 매니퓰레이터), Continuous variable space(연속 변수 공간), Real-time simulation (실시간 해석)

Abstract : The prominent advantages of binary manipulators over general manipulators having continuous joints are hyper-redundancy, high reliability and high task repeatability. Thus binary manipulators with many modules can be operated effectively under tough and complex work conditions. However, as far as the inverse kinematics is concerned, even the popularly-used Ebert-Uphoff algorithm cannot efficiently deal with binary manipulators having many modules due to its enormous memory requirement for real-time calculation. To overcome this limitation, we develop the inverse kinematics algorithm of binary manipulators based on optimization method. The states of binary joints are treated as design variables and the distance between the target and the end-effecter of the manipulator is constrained during the optimization. Using the proposed method, the inverse kinematics problem of three-dimensional binary manipulators having more than 30 modules can be solved within few seconds with small memory requirement. Furthermore, manipulation considerations such as operation power minimization can be easily incorporated into the proposed method with slight change of the formulation.

풍력발전기 타워-케이블 계의 진동 특성

김석현†(강원대)
박무열*(강원대 원) · C.X.Cui**(강원대 원)

Vibration Characteristics of a Tower-Guy Cable System of a Wind Turbine

Seockhyun Kim, Muyeol Park, C.X.Cui

Key Words: Small stand alone wind turbine(소형독립형풍력발전기), Tower-cable resonanceh(타워-케이블 공진), Rayleigh Ritz method(레일레이-리쯔 방법)

Abstract : Vibration characteristics of a small stand alone W/T(wind turbine) system are experimentally and theoretically investigated. Vibration is monitored on a wind turbine structure model and the data are analysed with the analytical results. Resonance problem is investigated under various operating speed. To predict the resonance speed of W/T, Rayleiy-Ritz method is applied to the tower-guy cable coupled system. The effect of the cable tension on the vibration characteristics is considered experimentally and analytically. Results of the study are utilized to design the stable structure of small size wind turbines which consist of the pivoted tower and the guy cable.