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紧连阀轴流压气机变转速过失速瞬态模型

Post stall transient model for axial compressor with closed-coupled valve under non-constant speed condition

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中文关键词： 轴流压气机 紧连阀 旋转失速 喘振 Moore-Greitzer模型

英文关键词:axial compressor closed-coupled valve rotating stall surge Moore-Greitzer model

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中文摘要：

为了给各种压气机喘振主动控制器提供验证平台,提出了一个新的旋转失速及喘振模型.该模型在Moore-Greitzer轴流压气机过失速瞬态模型的基础上,考虑了转子动态及旋转失速高阶谐波对压气机气动稳定性的影响,并且在模型中增加了紧连阀作为执行机构.仿真结果表明:随着压气机转速的增加,压气机的失稳行为由旋转失速转为喘振;压气机转速的变化作为系统内部扰动,可能使压气机在节流阀开度较大时便进入气动失稳状态;虽然压气机初始扰动仅含有1阶谐波,但随着旋转失速的发展,高阶谐波强度不断增长而变得不可忽略.

英文摘要：

To provide a verification platform for various active surge controllers, a new rotating stall and surge model for axial compressor was proposed. Based on Moore-Greitzer post stall transient model, influences of spool dynamics and higher harmonics of rotating stall waves were considered in the proposed new model. In addition, a closed-coupled valve was included in the model as an actuator. Several conclusions can be made from simulation results. Firstly, with the increasing of rotor speed, the instability behavior of compressor transforms from rotating stall to surge. Secondly, as an internal disturbance, the spool dynamic may lead to instability even under large throttle opening conditions. Finally, even the initial disturbance only includes the first harmonics, the higher harmonics may become strong and have a significant effect on the behavior of rotating stall.

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