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局部喘振频率特性及估算方法

Study on the frequency of partial surge and a frequency prediction method

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中文关键词: [局部喘振](#) [Helmholtz频率](#) [跨声速压气机](#) [失稳先兆](#) [Duct-Compressor-Plenum模型](#)

英文关键词: [partial surge](#) [Helmholtz frequency](#) [transonic compressor](#) [instability inception](#) [Duct-Compressor-Plenum model](#)

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中文摘要:

基于跨声速压气机实验,获得局部喘振现象轴向、低频、轴对称的频率特征;从局部喘振现象的物理本质出发,证明其与Helmholtz共振腔模型在物理上是相似的,采用Duct-Compressor-Plenum模型发展了实验台系统Helmholtz频率的估算方法,估算结果与实测的局部喘振频率基本一致;为了实验验证局部喘振与系统频率之间的关系,通过改变Helmholtz共振腔模型特征参数进行了跨声速实验,结果表明:局部喘振频率随着系统Helmholtz频率的下降而减小,并且两者的频率值也趋于一致,证明了局部喘振频率就是系统Helmholtz频率这一结论。

英文摘要:

Partial surge was kind of axisymmetric, low-frequency, hub region initiated disturbance by experimental investigations in a transonic compressor. In term of physical mechanisms, partial surge was much similar to an oscillation in a Helmholtz system. By Duct-Compressor-Plenum model, the Helmholtz frequency of the system was estimated, which was very close to the frequency of partial surge. To further verify this link between the frequency of partial surge and the Helmholtz frequency, experimental investigations were carried out with variation of specific parameters of the Helmholtz system. The results present that the frequency of partial surge varies with the Helmholtz frequency of the system. And the values of both frequency are very close. Therefore, the frequency of partial surge is determined by the Helmholtz frequency of the system.

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