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## 二维柔壁自适应壁风洞中三维模型近音速试验技术

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### PRELIMINARY RESEARCH OF NEAR-SONIC TESTING TECHNIQUE FOR 3-D MODEL IN 2-D ADAPTIVE WALL WIND TUNNEL

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摘要

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摘要 根据跨音速面积律将翼-身组合体模型转变为等效旋成体模型;并将风洞的矩形截面转变为等面积圆截面;由此通过轴对称跨音速小扰动速势方程求解圆截面风洞洞壁调节量;进而得到矩形截面上、下洞壁调节量。以堵塞比为2.64%的模型在西北工业大学高速二维柔壁自适应壁风洞中进行了翼面测压试验,并以同一模型在德国宇航院HKG风洞中(堵塞比为0.35%)做了对比试验。在近音速情况下( $Ma_{\infty}=0.94, 0.994$ 和 $1.008, \alpha=0^{\circ}, 2^{\circ}$ )时两者结果符合良好

关键词: 风洞试验 跨音速风洞 风洞壁 适应控制

Abstract: Using the transonic area rule, the model is considered as an equivalent body of revolution and the rectangular test section is transferred into a circular test section of equal cross-sectional area. The adjustment of the circular test section can be computed with the axisymmetrical transonic small perturbation potential equation, and then the top and bottom adjustment of the rectangular test section can be obtained. A model with blockage ratio 2.64% was tested in Northwestern Polytechnical University (NPU) 2-D flexible wall adaptive wind tunnel. The same model was tested in Germany DLR high speed wind tunnel HKG too (blockage ratio 0.35%). Under near-sonic conditions ( $Ma_{\infty}=0.94, 0.994$  and  $1.008, \alpha=0^{\circ}, 2^{\circ}$ ), the two results have good agreement.

Keywords: wind tunnel test transonic wind tunnel wind tunnel walls adaptive control

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