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Determination of Material Parameters for Rubberlike Hyperelastic Constitutive Models

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Abstract: The material parameters of Yeoh model and third order Ogden model, which were mainly used to characterize the hyperelastic behavior of rubber, were obtained by four different combinations of the uniaxial tension, biaxial tension and planar shear test data. The finite element models for the uniaxial tension, biaxial tension and planar shear experiments were established. Then a new method was explored to obtain the constitutive parameters for the rubberlike material by using the uniaxial tension test data in combination with the simulated results of biaxial tension and planar shear test from the finite element models. It was found that the fitting parameters of Yeoh model by using the combination of the uniaxial and biaxial tension test data were good. With the combination of uniaxial tension test data and simulated biaxial tension results, the fitting parameters of Yeoh model were only reliable in the low strain zone. The third order Ogden model had much higher prediction precision than Yeoh model. However, the Ogden model parameters from the finite element model had lower computation efficiency than that of Yeoh model, and it easily created the difficulty of convergence.

Key words: hyperelastic constitutive model; uniaxial tension; biaxial tension; planar shear; finite element model

带有橡胶层的汽车脚踏板

中图分类号:TQ336.4+3　　**文献标志码**:D

由钱德洪申请的专利(公开号　CN 102951057A,公开日期　2013-03-06)"带有橡胶层的汽车脚踏板",涉及的带有橡胶层的汽车脚踏板含有金属层,金属层表面设有橡胶层,橡胶层表面设有防滑凸起,条形凸纹为水平布置或者交错布置,点状凸起为阵列排布或者圆周排布。该汽车脚踏板的金属层表面设有橡胶层,使得乘客踩踏舒适,橡胶层的表面设有防滑凸起,保证了踏脚板的防滑性能,提高了安全系数。

(本刊编辑部　赵　敏)