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Finite Element Analysis on Fatigue Life Prediction for Rubber Material under Uniaxial Tension

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Abstract: The Mises stress and Lagrange strain distribution of a dumbbell specimen of rubber material under uniaxial tension loading were simulated by Abaqus/CAE finite element analysis software, and the stress and strain data at every node were extracted and imported to Matlab. The fatigue life of rubber materials at each node was obtained using a secondary development calculation program. The calculation results were imported into Abaqus/Visualization module by using Python language, and then the rubber fatigue life chart was acquired. The analysis results were consistent with the experimental test data.

Key words: rubber material; fatigue life; prediction; finite element analysis

一种碳纳米管填充天然橡胶复合材料 室温硫化制备方法

中图分类号: TQ332; TQ330. 38⁺3 文献标志码: D

由青岛科技大学申请的专利(公开号 CN 103554563A, 公开日期 2014-02-05)“一种碳纳米管填充天然橡胶复合材料室温硫化制备方法”, 涉及的材料配方为: 天然橡胶(NR) 100, 碳纳米管 8, 氧化锌 5, 硬脂酸 2, 防老剂 RD 1, 硫黄 3, 促进剂 ZDC 1, 促进剂黄原酸钾 1。其

制备工艺步骤为: (1) 将 NR 和碳纳米管分别溶于溶剂, 搅拌、超声使其分散均匀; (2) 将上述 2 种溶液混合均匀; (3) 用溶剂溶解橡胶助剂并超声分散, 混合均匀, 再加入 NR 和碳纳米管混合溶液中; (4) 在真空干燥箱内对分散均匀的混合溶液进行真空除泡; (5) 在室温下干燥制得产品。该发明在室温下即可制得 NR/碳纳米管复合材料, 具有设备简单、生产过程中无高温高压、操作容易的特点。

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