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## Determination of elastic constants for tire cord/ rubber composite

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**Abstract:** The determination of the elastic constants for cord/ rubber composite in FEA of tire was investigated based on the micro- and macro-mechanical theories. The application of Halpin-Tsai formula, Gough-Tangorra formula and Akaka-Hirano formula in the calculation of the elastic constants of cord/ rubber composite (longitudinal elastic modulus  $E_1$ , lateral elastic modulus  $E_2$ , shear modulus in plane  $G_{12}$ , primary Poisson's ratio  $\mu_{12}$  and second Poisson's ratio  $\mu_{21}$ ) which were simplified as a single-ply composite of same nature in lateral direction was described. It was proposed that the charge percentage of the cross-sectional area of steel cord could be used to characterize the Poisson's ratio of steel core  $\mu$ , and recommended that the fixed cross-section method was used to determine  $\mu$ . The elastic constants of different cord/ rubber composites could be determined by laser spot scatter method, clou- ding method and rail shear method. The phenomenon that  $\mu$  was greater than 1 was discussed.

**Key words:** tire; cord/ rubber composite; elastic constant; micro-mechanism; macro-mechanism

### 国家决定免征子午线轮胎消费税

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2000年12月28日,财政部和国家税务总局以财税(2000)145号文,联合下发了关于调整汽车轮胎消费税政策的通知。通知指出:经国务院批准,自2001年1月1日起,对“汽车轮胎”税目中的子午线轮胎免征消费税,对翻新轮胎停止征收消费税,其它轮胎继续按10%税率征收消费税。

自1994年国家税制改革以来,消费税问题一直困扰着轮胎行业。特别是近几年来,随着原材料价格的大幅上涨、斜交轮胎生产能力的盲目扩大以及产品结构调整跟不上相关工业发展步伐等问题的出现,轮胎市场的竞争更加激烈。加之外部政策的影响,使行业经济效益大幅度下降,直至出现亏损。因此,轮胎行业各

企业、轮胎工业协会、橡胶协会、中联橡胶(集团)总公司等单位多次向上级反映情况,呼吁取消轮胎产品消费税。国家石油和化学工业局也多次向有关主管部门汇报,反映轮胎行业存在的实际问题。国家综合部门经过慎重考虑,权衡利弊,作出了免征子午线轮胎消费税的决定。

免征子午线轮胎消费税,将从政策方面有力地促进轮胎行业产品结构的调整,加快轮胎产品升级换代的步伐。

这一政策的出台应引起各有关部门和企业的重视,认真研究切实可行的政策执行方案,特别是应积极配合税务部门,提出具体的操作办法。要在有关部门的组织下,做好企业间的协调工作,避免打价格战,切实享受到政策带来的好处,增强企业自我积累和自我改造的能力。

(国家经贸委行业规划司 刘玉岐供稿)