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Review on Electrostatic Hazards of Composite Solid Propellant

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Abstract: The progress in research on electrostatic hazards of composite solid propellant was summarized in three aspects, which are experimental testing method, theoretical prediction and electrostatic effect mechanism. Researchers used special equipments to measure the electrostatic energy acted on the sample indeed. This energy was the criterion of electrostatic sensitivity. The percolation coefficient was used as a simple prediction of electrostatic hazard, and the model based on hot spots forming & growth was used to predict the electrostatic hazard with the characters of propellant itself, such as mechanical, burning characters. Based on temperature measured by infrared method and observation heat radiation and transfer caused by electrostatic energy, the popularly accepted "hot spot" mechanism were outlined.

Key words: physical chemistry; composite solid propellant; electrostatics hazards
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第 8 届"用于凝聚态物质中冲击加载的新模型和爆炸流体力学的计算机程序"国际会议概况

第 8 届"用于凝聚态物质中冲击加载的新模型和爆炸流体力学的计算机程序"国际会议于 2010 年 5 月 24 – 28 日，在法国巴黎召开。会议由法国的 CEA 主办，参会者主要来自于俄罗斯、法国、美国、中国、英国。参会文章 135 篇，大会报告 31 篇，其中 14 篇为特邀报告；分会场口头报告主要分为 3 类：Hydrodynamic、Microscopic、Experimental，共 79 篇；海报 25 篇。

会议的主题包括两方面：一方面是金属系统内的冲击波：适用状态方程、弹塑定理、损伤模型和相关研究；另一方面是炸药中的冲击波：未经反应的炸药及爆轰产物的状态方程、反应区（化学与热动力性质）的分析及相关研究。

在含能材料方面，美国的 L. E. Fried、俄罗斯的 I. I. Karpenko 等从微观尺度层次介绍了冲击、剪切作用下热点的形成过程。会议论文中，多篇文章介绍或总结了相关炸药的点火、成长模型，未反应炸药状态方程及爆轰产物状态方程。如美国的 R. Menikoff 介绍了三种点火增长模型：DAGMAR、JTF、CREST，其中 CREST 模型在多篇文章中提到。俄罗斯的 B. A. Nadykto 对多种未反应炸药及爆轰产物的状态方程进行了归纳总结。实验研究方面，俄罗斯进行了较为细致的研究，他们对非理性炸药、炸药结构对其能量输出的影响、双冲击起爆等方面开展了工作，包括爆炸残骸软回收技术等的应用。

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