

## Reliability Analysis of Polymer Bonder Explosive Based on Separation between Aleatory Uncertainty and Epistemic Uncertainty

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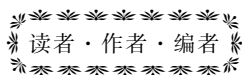
**Abstract:** The uncertainties of model parameters, structural geometry, material property, and external force of the polymer bonder explosive, were quantified with probability box and propagated with nested sampling method in order to separate the different effect of aleatory uncertainty and epistemic uncertainty on response of interest. Moreover, numerical error and model form error were also quantitatively superposed to acquire the response uncertainty and the reliability interval of the polymer bonder explosive (PBX) structure consequently. In addition, the results of proposed method in this paper were compared with the determinate checking method and the probabilistic reliability method. It is indicated that the reliability assessment with the consideration of uncertainty can reduce the engineering risk than the determinate method. Furthermore, the reliability interval obtained by the proposed method covers the reliability calculated by probabilistic method, and can narrow down to the true reliability as the epistemic uncertainty decreases.

**Key words:** polymer bonder explosive(PBX); probability box; epistemic uncertainty; reliability

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### 《含能材料》“损伤与点火”征稿

含能材料的损伤特征与点火过程有密切的联系,炸药、推进剂的内部损伤及其对力学特性、安全特性和点火行为的影响规律受到了含能材料学界的高度重视,为推动这一重要研究方向的学术交流,本刊特设立“损伤与点火”专栏。专栏主要征集炸药、推进剂等含能材料的损伤观测与多尺度表征技术、含损伤的本构方程、准静态与动态损伤演化规律、损伤与破坏的宏(细)观模式、损伤对起爆、爆炸、爆轰成长以及非冲击起爆行为的影响等方向的原创性研究论文。来稿请注明“损伤与点火”专栏。

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