Numerical Simulation and Verification of Porous Nitroguanidine Gun Propellant Extrusion

CHANG Fei, NAN Feng-qiang, HE Wei-dong

(*School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing* 210094, *China*)

Abstract: To investigate the problem about effect of formulations and extrusion process of nitroguanidine gun propellant on the extrusion molding size, the mathematical model and boundary conditions of extrusion process for nitroguanidine gun propellant with different formulations were established. The distribution siteration of shear rate field, pressure field and velocity field in different flow process under the condition of different formulations were simulated, calculated and obtained by the finite element method. The results show tha the actual outer diameter of 8.03 mm and simulation size of 8.38 mm of the propellant is basically the same, its error is 4.36%. The error of outer web size (7.89%), inner web size (3.10%), pore size (9.26%) and center pore size (5.36%) etc parameters is within 10%.

Key words: nitroguanidine gun propellant; numerical simulation; shear rate; pressure and velocity field; extrusion process

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读者·作者·编者

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含能共晶是不同含能分子通过氢键等相互作用力形成的具有稳定结构和性能的分子晶体。含能共晶充分组合了单质含能分子的优点，呈现出感度低，综合性能优良的特点，具有潜在的应用前景，共晶研究已经引起国内外含能材料学界的高度关注。为推动含能共晶的研究和交流，本刊特推出“含能共晶”专栏，主要征稿范围包括含能共晶晶体设计与性能预测、含能共晶的制备、结构解析、性能等。来稿请注明“含能共晶”专栏。

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