عنوان مقاله:

Aerodynamic Characterization of Bullet Heads with Different Arcuate Curves

محل انتشار:

دوماهنامه مکانیک سیالات کاربردی, دوره 17, شماره 5 (سال: 1403)

تعداد صفحات اصل مقاله: 12

نویسندگان:

B. Hao – School of Mechanical Engineering and Automation, Northeastern University, Shenyang۱۱۰۸۱۹, China

Q. Jiang – School of Control Engineering, Northeastern University at Qinhuangdao, Qinhuangdao۰۶۶۰۰۴, China

C. Xu – School of Control Engineering, Northeastern University at Qinhuangdao, Qinhuangdao۰۶۶۰۰۴, China

L. Liu – School of Control Engineering, Northeastern University at Qinhuangdao, Qinhuangdao۰۶۶۰۰۴, China

خلاصه مقاله:

The bullet shape is critical in efficient bullet design because it affects the lift and drag forces. This paper proposes a new bullet shape with a logarithmic curve and analyzes the lift and drag coefficients of bullets with different curves under different angles of attack. The results are compared with a bullet whose shape is described by the power law curve. Fluent simulations demonstrate that the optimal power exponent values are ۰.۶۵, ۰.۶, and ۰.۶۵ for the bullet with the power law curve and ۱.۳, ۱, and ۱ for the bullet with the logarithmic curve at ۰°, ۳۰°, and ۴۰° angles of attack, respectively. At a ۰° angle of attack, the lift coefficient of the logarithmic curve is the largest. The lift force of the bullet with the logarithmic curve is ۱۲۹.۴% higher than that with the von Karman curve. The drag coefficient is the largest for the bullet with the rectilinear curve; it is ۱.۳۰% larger than that of the bullet with the logarithmic curve. At ۳۰° and ۴۰° angles of attack, the lift coefficient of the bullet with the power law curve is larger. The difference in the lift coefficients between the two angles of attack is ۱۸.۴۷%. The bullet's drag coefficient is the largest for the logarithmic curve, and the difference in the drag coefficients between the two angles of attack is ۱۸.۵۹%.

کلمات کلیدی:

Arcuate Curve, Drag coefficient, Lift Coefficient, Power exponent, Computational fluid dynamics