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弹丸质量对高强度薄钢板抗弹性能影响的模拟分析

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Title: Simulation Analysis of the Influence of Bullet Mass on the Ballistic Performance of High Strength Thin Steel Plate

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摘要: 利用有限元模拟法研究了弹丸质量对两种高强度薄钢板抗弹性能的影响,从钢板的破坏形貌、受力和吸收能量的角度分析了不同质量弹丸冲击钢板的过程,最后设计相关试验对模拟结果进行了验证。结果表明:较高强度钢板的抗弹性能要优于较低强度钢板,钢板背凸高度和残余弹丸的长度均较小。随弹丸质量增加,钢板的背强下降,但是弹丸穿透钢板时需要的动能增加。低质量小口径弹丸能量集中传递给钢板,钢板受力较大,能够吸收的弹丸能量较少。

Abstract: Finite element simulation was used to study the influence of bullet mass on the ballistic performance of two high strength thin steel plates. From the damage morphology, the force put by bullet and the energy consumption of steel plates, the impact process by different mass bullets was analyzed. Finally, the correlative experiments were designed to proof the simulation. The results showed that: Ballistic performance of the higher strength steel plate is better than the lower strength steel plate, bulge height of steel plate and length of residual bullet are smaller. With the increase of bullet mass, ballistic limit of steel plate decrease, while the kinetic energy of bullet pierced steel plate increase. The energy of low mass small caliber bullet passed to the plate concentrate on the smaller area, the force put on the steel plate is larger, and the steel plate is less able to absorb the bullet energy.

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