

其他

简谐正弦磁压力对电磁发射轨道的瞬态响应

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摘要:

为解决电磁发射轨道发射精度不够高及炮筒使用年限不够长的难题,将电磁炮发射轨道模拟为移动载荷作用下弹性基础上的简支梁,利用欧拉梁理论建立了梁的力学模型;借助积分变换及逆变换和计算留数等方法,推导出简谐压力作用下轨道梁瞬态响应解析解;借助MATLAB软件分析了粘滞外阻尼系数、摩擦阻尼系数、弹性系数对梁的瞬态动力响应的影响。计算分析表明:轨道梁的挠度随黏滞外阻尼系数的增大而减小;随着材料应变阻尼系数的增大而增大;而弹性系数对挠度的影响不太明显,挠度曲线随着弹性系数的增加而呈下降的趋势。

关键词: 电磁发射轨道 积分变换 积分逆变换 欧拉梁理论 瞬态响应 解析解

The transient influence of the electromagnetic launch orbit under the harmonic sinusoidal magnetic pressure

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Abstract:

In order to solve the problem of the lower accuracy of electromagnetic emission-orbital launches and the shorter life of the barrel,The orbit of the gun fired was simulated into the simply supported beam on elastic foundation under the role of the moving load, and the mechanical model of the beam was established using the Euler beam theory. The integral transform and its inverse transform and the method of calculating the residue were used, and the transient response analytical solution of the track under the harmonic pressure was derived. The influencing factors of the transient dynamic response of the beam outside the viscous damping coefficient, damping coefficient of friction,coefficient of elasticity were analyzed by MATLAB software. Examples showed track beam deflection decreased with the increasing of the viscous outer damping, and with the increasing of the material response of damping, while the elasticity coefficient was less obvious deflection. With the increasement of the elastic coefficient the deflection curve was a downward trend.

Keywords: electromagnetic launch trajectory integral transformation integral inverse transformation Euler beam theory transient response analytical solution

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