

### 激振器工作原理

#### The Working Principle of Vibration Exciter

电磁激振器的工作原理类似于一个扬声器，即通导体在磁场中受电磁力的作用而运动。对运动部件产生加速度的力是通过均衡的调节驱动电流和磁通量来完成的。因此通过控制驱动电流，就可以实现对振动激励器的控制；

The working principle of the electromagnetic vibration exciter is similar to a loudspeaker whereby electrical conductor is moved by the action of electromagnetic force in the magnetic field. The force to accelerate the moving part is generated by the balance between driving current and magnetic flux. Therefore, by controlling the driving current, one can control of the vibration generator.



弗莱明左手法则 Fleming's left hand rule

电磁激振器能达到的最大加速度水平是由最大电流和负载决定的，在低频时，因为受运动部分位移量的限制，加速度水平不会达到很高。运动单元共振频率的设置高于频率范围的上限。

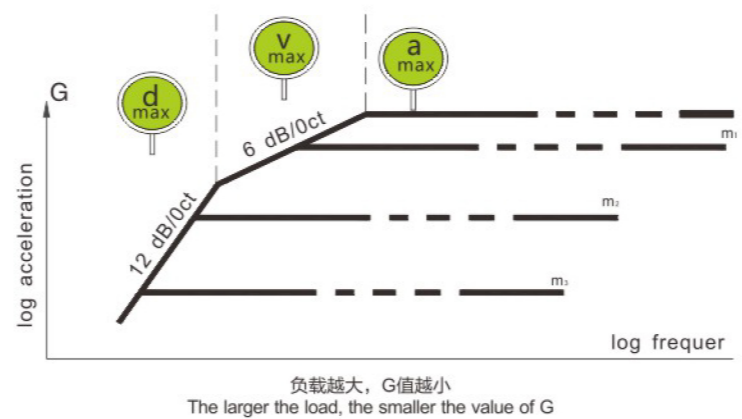
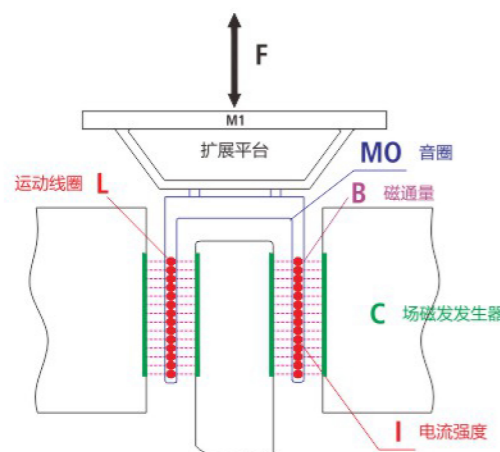
激励器的性能可以通过图表反映出来，将不同频率下的最大加速度功能进行显示。通过一个两对坐标图，可以将位移量限制在一条斜率为6分贝/倍频程的直线表示。

The maximum acceleration level of the electromagnetic vibration exciter is determined by the maximum current and the load. At low frequency, displacement of moving part will impose a limitation and the acceleration will not reach high level. The resonance frequency of the moving element is set higher than the upper limit of the frequency range.

The performance of vibration generator can be reflected by the chart that display the maximum acceleration under different frequency. By using a log-log plot, the displacement can be restricted to a linear representation with slope of 6 dB/octave.

$$F = B \times I \times L$$

激振力(N)	Exciting force (N)
磁场强度(T)	Magnetic field intensity (T)
电流(A)	Current (A)
长度(m)	Length (m)



### 试验条件与基本系统选型指导 Test requirements and model selection guide

要选择一个适当的振动试验系统,最重要的是知道履行一个振动试验需要的激振力,评估计算激振力需要了解以下的试验规格:  
To choose a suitable vibration test system, the most important thing is to know the exciting force required to perform the vibration test. To evaluate and calculate the exciting force, the following test specifications should be known:

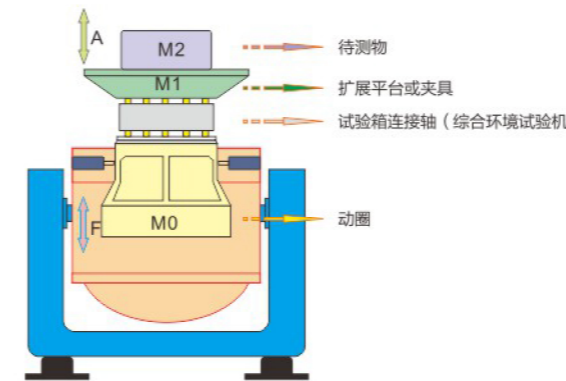
- 清晰的试验条件 Clear Testing Requirements
- 频率(频率范围) Frequency (Frequency Range)
- 最大的加速度 Maximum Acceleration
- 最大的位移 Maximum Displacement
- 最大的速度 Maximum Velocity
- 试验品质量和装夹器具 Specimen Mass and Fixation

需要根据试验频率的上限和尺寸来选择一个夹具(垂直扩展平台)或水平滑台,需要用其质量来评估振动试验所需要激振力。  
The specimen fixation is selected based on the upper limit of test frequency and specimen size, either vertical expansion platform or horizontal slip table. Specimen mass is needed to evaluate the required exciting force for vibration test.

#### 评估动圈的质量 Evaluation of Armature Mass

评估振动试验需要的激振力时,你可以选择一个临时的动圈质量(根据EV系列的型号)。  
When evaluating the exciting force needed for vibration test, you can choose a temporary armature mass (according to the model of EV series).

### 计算所需要的激振力 Calculate the required excitation force



$$F = (M0 + M1 + M2) \times A \times 1.3$$

Sine Force 正弦推力(p-p)  
F Exciting Force 激振力(kgf)  
M0 Armature mass 动圈重量(kg)  
M1 Auxiliary table or Fixture 平台或夹具重量(kg)  
M2 Specimen 待测物件重量(kg)  
A 加速度g

1.3: Safety Factor(安全系数)  
Random Force 随机推力(Rms)  
= sine Force /  $\sqrt{2}$   
Shock Force 冲击推力  
= Sine Force \* 2 正弦推力\*2

注: 当采用重力单位时, 加速度单位为g, 激振单位为kgf, 其中1g=9.8m/s<sup>2</sup>;  
When using gravity as unit, the acceleration unit is g, exciting force unit is kgf, 1g=9.8m/s<sup>2</sup>;

### 振动试验机选型指导 Vibration test machine selection guide

系统命名信息  
Model Rules

