

Shaker Ling V456 driving a 100 kg test item. SI units

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requested acceleration profile in $m s^{-2}$, assume RMS, for 5, 10, 15..80 Hz

acc:=
(2.89)
(3.04)
(3.72)
(4.72)
(5.85)
(6.98)
(8.16)
(9.55)
(10.71)
(12.2)
(13.46)
(15.01)
(16.7)
(18.32)
(20.29)
(22.73)

Shaker specifications

$$\text{Ling rms N} = \frac{489}{\sqrt{2}}$$

The shaker can provide a maximum force of 489 N

$$\text{Ling rms N} = 345.78$$

$$\text{LingpkpkN} = \text{Ling rms N} \cdot \sqrt{2}$$

$$\text{maxstroke} = .019$$

The shaker also has a displacement limit of 19 mm pk pk

$$\text{Ling coil mass} = .426$$

Shaker table and test item system

$$\text{testmass} = 100$$

$$k = 4 \cdot 63.5 \cdot 1000$$

$$c = 100$$

$$M = \text{testmass} + \text{Ling coil mass}$$

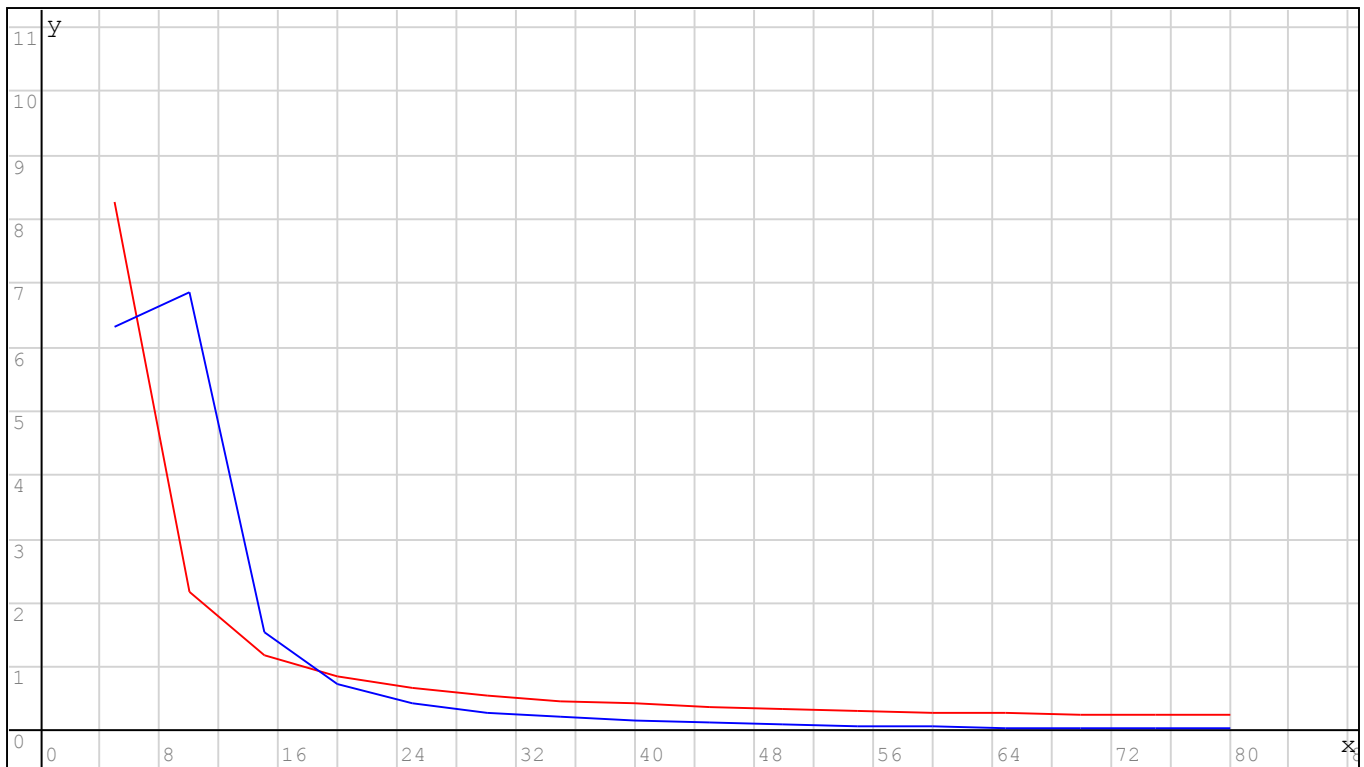
$$\frac{\sqrt{\frac{k}{M}}}{2 \cdot \pi} = 8$$

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for i ∈ 1..16
  fi := i·5
  pk pk profilei 2 :=  $\frac{\text{acc}_i}{(2 \cdot \pi \cdot f_i)^2} \cdot 2 \cdot \sqrt{2} \cdot 1000$ 
  LingXi 2 :=  $\left| \frac{\text{LingpkpkN}}{k + \sqrt{-1} \cdot 2 \cdot \pi \cdot f_i \cdot c - (2 \cdot \pi \cdot f_i)^2 \cdot M} \right| \cdot 1000$ 
  if LingXi 2 > maxstroke 1000
    LingXi 2 := maxstroke 1000
  else
    LingXi 2 := LingXi 2
  pk pk profilei 1 := fi
  LingXi 1 := fi

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LingX, the blue line, is the maximum pk pk displacement in mm that the 456 can manage driving a system mass M on springs k and damping c. The red line, pk pk profile, is the displacement of the requested acceleration profile acc. This plot has been scaled in millimetres. As can be seen the shaker can only meet the required profile near resonance.



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{ LingX
{ pk pk profile

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