$f\_m\_1 := 4.22\text{Hz}$ Egensvining fra modeshape 1

$f\_m\_2 := 6.59\text{Hz}$ Egensvining fra modeshape 2

$f\_m\_3 := 16.9\text{Hz}$ Egensvining fra modeshape 3

$f\_w\_1 := 1.55\text{Hz}$ bevægelsesfrekvensen for personen

$h\_1 := 1 \quad h\_2 := 2 \quad h\_3 := 3 \quad h\_4 := 4$ harmonisk lastkomponent

$$D\_L\_F := 0.41\cdot\left[\left(\frac{f\_w\_1}{\text{Hz}}\right) - 0.95\right] = 0.246$$

$\text{Hz} = 1\,\frac{1}{\text{s}}$

$F\_h\_1 := 700\text{N}\cdot D\_L\_F = 172.2\cdot\text{N}$ gennemsnitlige vægt af person

$\text{N} = 1\,\text{N}$

$\zeta\_m := 0.9\%$

$m\_m := 36960\text{kg} = 3.696\times 10^{4}\cdot\text{kg}$ modal massen

$f\_h\_1 := h\_1\cdot f\_w\_1 = 1.55\cdot\text{Hz}$ Harmonisk lastfrekvens fra den 1.harmoniske lastkomponent og bevægelsesfrekvens f_w_1

$f\_h\_2 := h\_2\cdot f\_w\_1 = 3.1\cdot\text{Hz}$ Harmonisk lastfrekvens fra den 2.harmoniske lastkomponent og bevægelsesfrekvens f_w_1

$f\_h\_3 := h\_3\cdot f\_w\_1 = 4.65\cdot\text{Hz}$ Harmonisk lastfrekvens fra den 3. harmoniske lastkomponent og bevægelsesfrekvens f_w_1

$f\_h\_3 := h\_4\cdot f\_w\_1 = 6.2\cdot\text{Hz}$ Harmonisk lastfrekvens fra den 4, harmoniske lastkomponent og bevægelsesfrekvensen f_w_1

$$A\_m := 1 - \left(\frac{f\_h\_1}{f\_m\_1}\right)^2 = 0.865$$

$$B\_m := 2\cdot\zeta\_m\cdot\frac{f\_h\_1}{f\_m\_1} = 6.611\times 10^{-3}$$

$5.74\cdot 10^{(-4)} = 0.000574$

$6.51\cdot 10^{-6} = 0.0000065$

$\mu\_t\_m\_1 := 1$

$L := 20\text{m}$

$$y := \frac{L}{2}$$

$$\mu\_e\_m\_1 := \sin\left(\frac{\pi\cdot y}{L}\right) = 1$$

$\rho\_h\_m := 1 = 1$

$$\alpha\_real\_h\_m\_1 := \left(\frac{f\_h\_1}{f\_m\_1}\right)^2\cdot\frac{F\_h\_1\cdot\mu\_t\_m\_1\cdot\mu\_e\_m\_1\cdot\rho\_h\_m}{m\_m}\cdot\frac{A\_m}{(A\_m)^2 + (B\_m)^2} = 0.0007265276\cdot\frac{\text{m}}{\text{s}^2}$$

real acceleration ved modeshape 1

$$\alpha\_imag\_h\_m\_1 := \left(\frac{f\_h\_1}{f\_m\_1}\right)^2\cdot\frac{F\_h\_1\cdot\mu\_t\_m\_1\cdot\mu\_e\_m\_1\cdot\rho\_h\_m}{m\_m}\cdot\frac{B\_m}{(A\_m)^2 + (B\_m)^2} = 0.0000055524\cdot\frac{\text{m}}{\text{s}^2}$$

imag acceleration ved modeshape 1

For a particular footfall r
each of the first four harr

Firstly, for each harmoni

1. Calculate the har

$f_h = hf_w$

2. Calculate the har

For each mode, n

3. Calculate the real

$F_h = DLF.P$

where DLF is calc
weight of the wal

$a_{real,h,m} = \left(\frac{f_h}{f_m}\right)^2$

$a_{imag,h,m} = \left(\frac{f_h}{f_m}\right)^2$

where $A_m = 1 - ($

ζ_m can be estimat

described in Appe

4. Sum the real and
imaginary acceler

$$a_{real,h} = \sum_{m} a_{real,h,m}$$

5. Find the magnitu
modes to this har

$$|a_h| = \sqrt{a_{real,h}^2 + a$$

ate, f_w, it is required to calculate the response in each mode to
monics:

: h, from $h = 1$ to $h = 4$.

monic forcing frequency, f_h:

(4.3)

monic force, F_h, at this harmonic frequency from Table 4.3:

n

l and imaginary acceleration ($a_{real,h,m}$, $a_{imag,h,m}$) in each mode:

ulated from Table 4.3 (Design value) and P equals the static
ker.

$$\frac{F_h \mu_{r,m} \mu_{e,m} \rho_{h,m}}{\hat{m}_m} \frac{A_m}{A_m^2 + B_m^2} \tag{4.4}$$

$$\frac{F_h \mu_{r,m} \mu_{e,m} \rho_{h,m}}{\hat{m}_m} \frac{B_m}{A_m^2 + B_m^2}$$

$\left.{}^{f_h}\!/\!{}_{f_m}\right)^2$, $B_m = 2\zeta_m \, {}^{f_h}\!/\!{}_{f_m}$, $\rho_{h,m}$ is from equation 4.2

ted from Table A2 and f_m, $\hat{m}_m$ and μ are found using methods ndix A.

imaginary responses in all modes to yield the total real and
ation to this harmonic force, a_h:

$$; \qquad a_{Imag,h} = \sum_m a_{Imag,h,m} \qquad (4.5)$$

de of this acceleration $|a_h|$ which is the total response in all
monic (at this frequency):

$$\overline{\quad a_{Imag,h}^2} \qquad (4.6)$$