Thiele - Small Parameter Consistency Check

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Constant Definitions

$cycle := 2 \cdot \pi \cdot rad$

$Hz := cycle \cdot sec^{-1}$

$c := 344 \cdot m \cdot sec^{-1}$

$\rho := 1.205 \cdot kg \cdot m^{-3}$

User Input Data

Known Driver Thiele / Small Parameters

$f_d := 51.5 \cdot Hz$ $\quad$ $Q_{md} := 5.391$

$R_e := 7.06 \cdot ohm$ $\quad$ $Q_{ed} := 0.5518$

$S_d := 324 \cdot cm^2$ $\quad$ $V_{ad} := 144.377 \cdot liter$

Calculated Parameters

Derived Thiele / Small Parameters

$Q_{td} := \left(\frac{1}{Q_{ed}} + \frac{1}{Q_{md}} \right)^{-1}$ $\quad$ $Q_{td} = 0.501$

$C_{md} := V_{ad} \cdot \left(\rho \cdot c^2 \cdot S_d^2 \right)^{-1}$ $\quad$ $C_{md} = 9.645 \times 10^{-4} \frac{m}{newton}$

$M_{md} := \left(C_{md} \cdot f_d^2 \right)^{-1}$ $\quad$ $M_{md} = 9.902\ gm$

$Bl := \left(\frac{f_d \cdot R_e \cdot M_{md}}{Q_{ed}} \right)^{0.5}$ $\quad$ $Bl = 6.403 \frac{newton}{amp}$ (1 newton/amp = 1 Tesla-m)

$\eta_o := V_{ad} \cdot \left(2 \cdot \pi \cdot c^3 \cdot Q_{ed} \cdot f_d^{-3} \right)^{-1}$ $\quad$ $\eta_o = 3.466\ \%$

$SPL := 112 + 10 \cdot \log(\eta_o)$ $\quad$ $SPL = 97.4$ dB