



0 / 74: 7 ' HMLJQ: RUNKH-HVFRXVMF DQG(OFWLFDS HVSQVMH

6 RIVZDUH E\ 0 DVMQ . IQJ
HP DIQ- . IQJ # DRERP

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5 HHUHQFH ' HMLJQDQG&RQWUKFWRCRI D0 DMV/ RDGHG7DSHUHG4 XDUMU DYHDIQJW7XEHO / 74: 7
8 VIQJ WHH) RVM() () XGDIQH' UYHU
E\ 0 DVMQ . IQJ

8 QUDQG&RQWMDQWH LQLMRQ

cycle := 2·π·rad

Hz := cycle·sec⁻¹

\$IU HQMW ρ := 1.21·kg·m⁻³

6 SHHGRI 6 RXQG c := 342·m·sec⁻¹



8 VHUQSWX G7KLV6 FMRQDQG QSDI WH3 DUDP HMLV/IRUMH6\ WMP VREH\$ QDOJ HG

' UYH7KLHDI6 P DGDUDP HMLV) RVM() (3 URSHUWHV

$f_d := 45 \cdot \text{Hz}$

$V_d := 88 \cdot \text{liter}$

$R_e := 8 \cdot \Omega$

$Q_{ed} := .65$

$L_{vc} := .5 \cdot \text{mH}$

$Q_{md} := 2.6$

$B_l := 7.2 \cdot \frac{\text{newton}}{\text{amp}}$

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

$S_d := 132 \cdot \text{cm}^2$

$Q_{td} = 0.520$

0 / 74: 7 * HRP HM ' HILQVRQMHH) UYXHSJ RI WHUHUUHQFHGDUMFQ

$L := 70 \cdot \text{in}$

HQJWKR WH0 / 74: 7

$\xi := .25$

UYH3 RVMRG5 DMR

$S_0 := .5 \cdot S_d$

UHDRI WHVP DDIQRI WH0 / 74: 7

$S_L := 6 \cdot S_d$

UHDRI WHQJHHQRI WH0 / 74: 7

Density := 1·lb·ft⁻³

WIIIQ GHQMW EIW EIW

$r_{\text{port}} := 1.5 \cdot \text{in}$

DGLXVRI WHSRUV

$L_{\text{port}} := 1 \cdot \text{in}$

HQJWKR WHSRUV

7UDQVP LVLRQ/ LGH' HIQMRQ

EIW ØIW

$$n_{\text{closed}} := 4$$

QBRVHG

$$n_{\text{open}} := 4$$

QBRSH

* HRP HW ' HIQMRQ

$$TR := (S_L - S_0) \cdot L^{-1}$$

$$TR = 0.041 \text{ m}$$

&BRVHG(QGRI 7UDQVP LVLRQ LGH

UWU &BRVHG(QG

6HFMRQ HQVM

,QWDSUHD

) LQDSUHD

6WIIHQJ ' HQVM

$$L_{c_0} := L \cdot \xi \cdot (n_{\text{closed}} + 1)^{-1}$$

$$S_{c_{0,0}} := S_0 + TR \cdot \xi \cdot L$$

$$S_{c_{0,1}} := S_{c_{0,0}} - TR \cdot L_{c_0}$$

$$D_{c_0} := \text{Density}$$

$$L_{c_1} := L \cdot \xi \cdot (n_{\text{closed}} + 1)^{-1}$$

$$S_{c_{1,0}} := S_{c_{0,1}}$$

$$S_{c_{1,1}} := S_{c_{1,0}} - TR \cdot L_{c_1}$$

$$D_{c_1} := \text{Density}$$

$$L_{c_2} := L \cdot \xi \cdot (n_{\text{closed}} + 1)^{-1}$$

$$S_{c_{2,0}} := S_{c_{1,1}}$$

$$S_{c_{2,1}} := S_{c_{2,0}} - TR \cdot L_{c_2}$$

$$D_{c_2} := \text{Density}$$

$$L_{c_3} := L \cdot \xi \cdot (n_{\text{closed}} + 1)^{-1}$$

$$S_{c_{3,0}} := S_{c_{2,1}}$$

$$S_{c_{3,1}} := S_{c_{3,0}} - TR \cdot L_{c_3}$$

$$D_{c_3} := \text{Density}$$

$$L_{c_4} := L \cdot \xi \cdot (n_{\text{closed}} + 1)^{-1}$$

$$S_{c_{4,0}} := S_{c_{3,1}}$$

$$S_{c_{4,1}} := S_0$$

$$D_{c_4} := \text{Density}$$

2 SHQ(QGRI 7UDQVP LVLRQ LGH

UWU 2 SHQ(QG

6HFMRQ HQVM

,QWDSUHD

) LQDSUHD

6WIIHQJ ' HQVM

$$L_{o_0} := L \cdot (1 - \xi) \cdot (n_{\text{open}})^{-1}$$

$$S_{o_{0,0}} := S_{c_{0,0}}$$

$$S_{o_{0,1}} := S_{o_{0,0}} + TR \cdot L_{o_0}$$

$$D_{o_0} := \text{Density}$$

$$L_{o_1} := L \cdot (1 - \xi) \cdot (n_{\text{open}})^{-1}$$

$$S_{o_{1,0}} := S_{o_{0,1}}$$

$$S_{o_{1,1}} := S_{o_{1,0}} + TR \cdot L_{o_1}$$

$$D_{o_1} := 0.0 \cdot \text{lb} \cdot \text{ft}^{-3}$$

$$L_{o_2} := L \cdot (1 - \xi) \cdot (n_{\text{open}})^{-1}$$

$$S_{o_{2,0}} := S_{o_{1,1}}$$

$$S_{o_{2,1}} := S_{o_{2,0}} + TR \cdot L_{o_2}$$

$$D_{o_2} := 0.0 \cdot \text{lb} \cdot \text{ft}^{-3}$$

$$L_{o_3} := L \cdot (1 - \xi) \cdot (n_{\text{open}})^{-1}$$

$$S_{o_{3,0}} := S_{o_{2,1}}$$

$$S_{o_{3,1}} := S_{o_{3,0}} + TR \cdot L_{o_3}$$

$$D_{o_3} := 0.0 \cdot \text{lb} \cdot \text{ft}^{-3}$$

$$L_{o_4} := L_{\text{port}} + 0.6 \cdot r_{\text{port}}$$

$$S_{o_{4,0}} := \pi \cdot r_{\text{port}}^2$$

$$S_{o_{4,1}} := \pi \cdot r_{\text{port}}^2$$

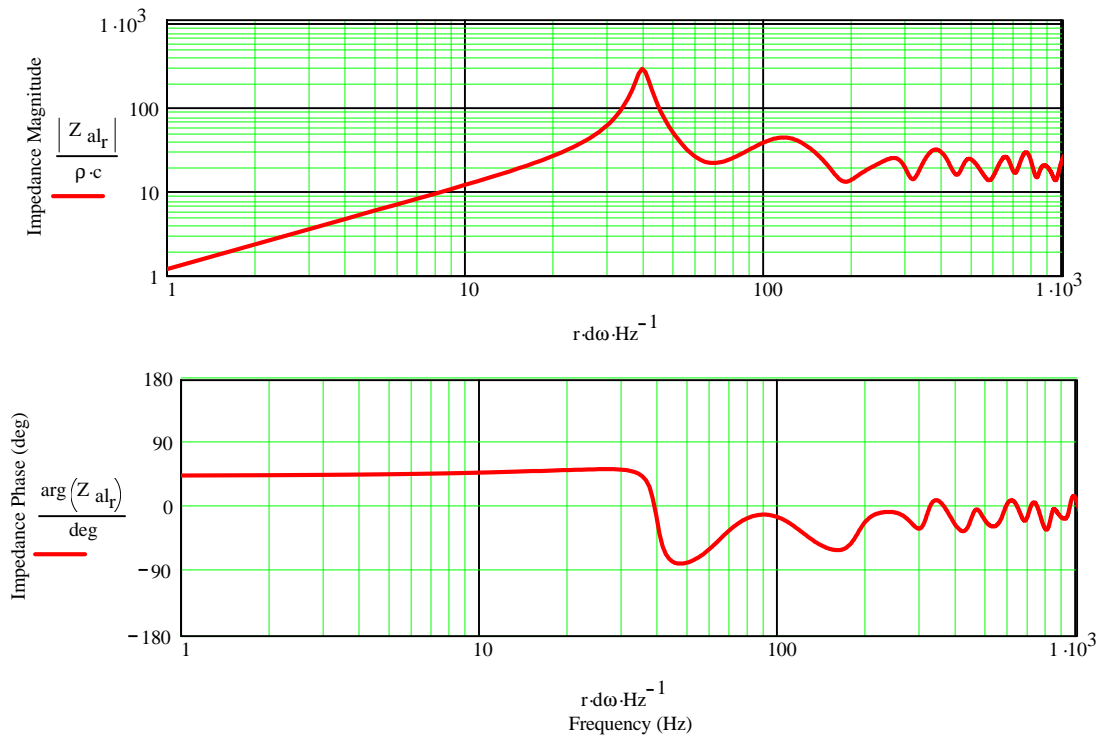
$$D_{o_4} := 0.0 \cdot \text{lb} \cdot \text{ft}^{-3}$$

7RMOHQVMRI WU7UDQVP LVLRQ LGH

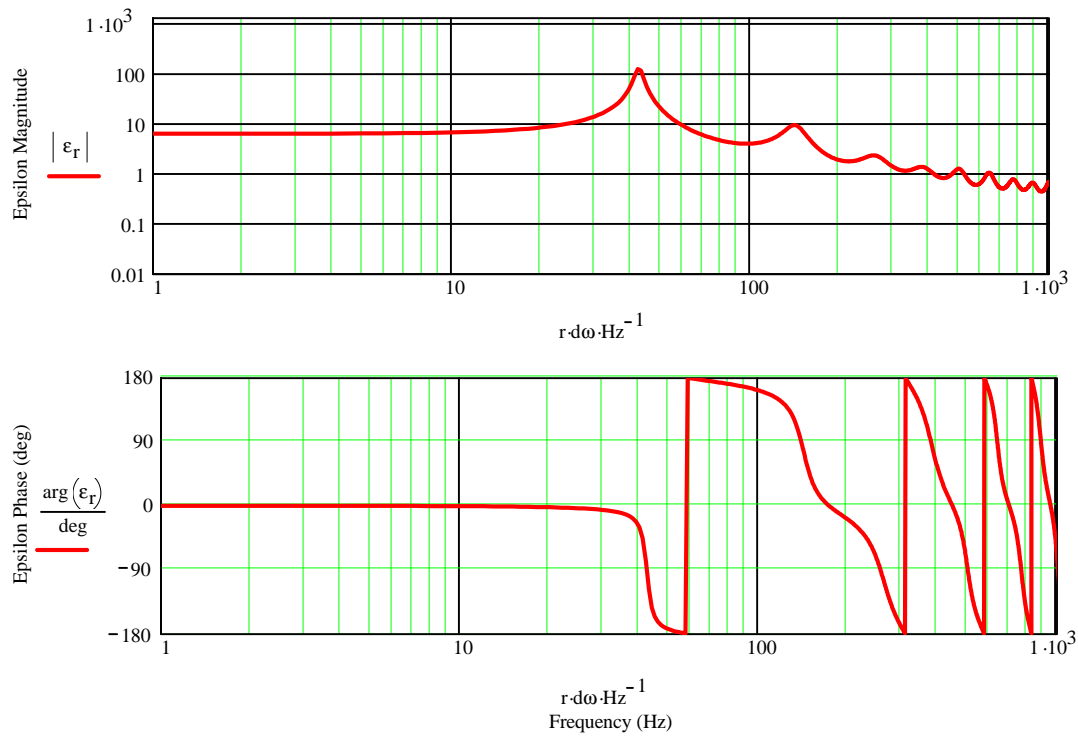
$$\sum_{i=0}^{n_{\text{closed}}} L_{c_i} + \sum_{i=0}^{n_{\text{open}}} L_{o_i} = 71.900 \text{ in}$$



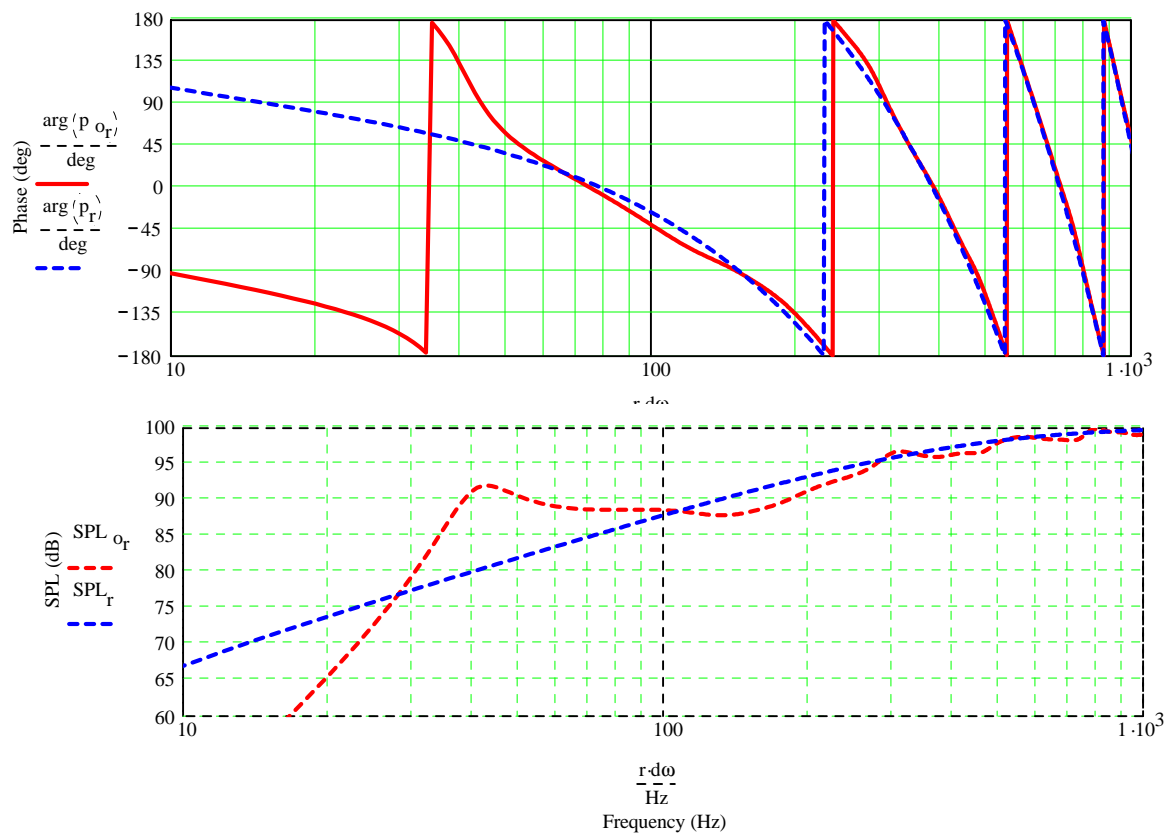
5 HVXOMQJ \$ FRXVMF ,P SHGDQFHIRUMKH7UDQVP LVMLRQ/ LQH



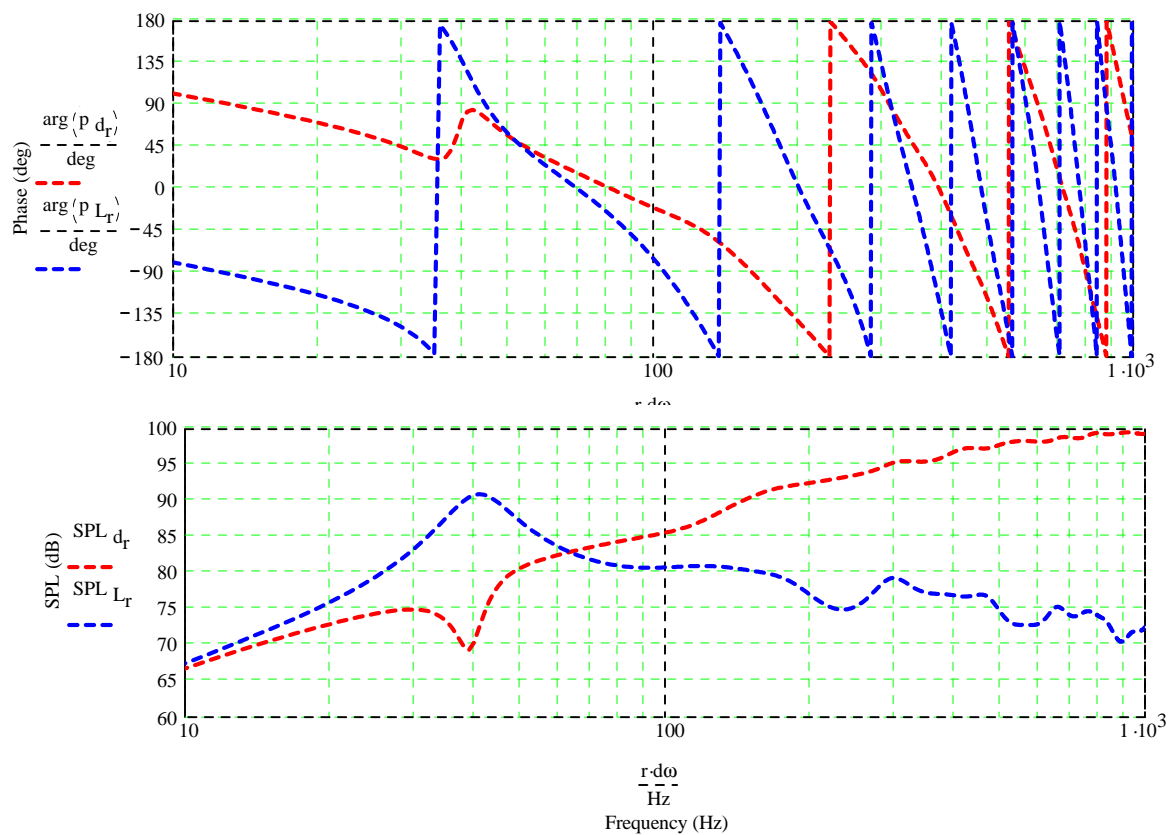
9 HOFUW DMKH7HLP LQXVRI WKH7UDQVP LVMLRQ/ LQHIRUDP VHF' UYHU [FLMMLRQ

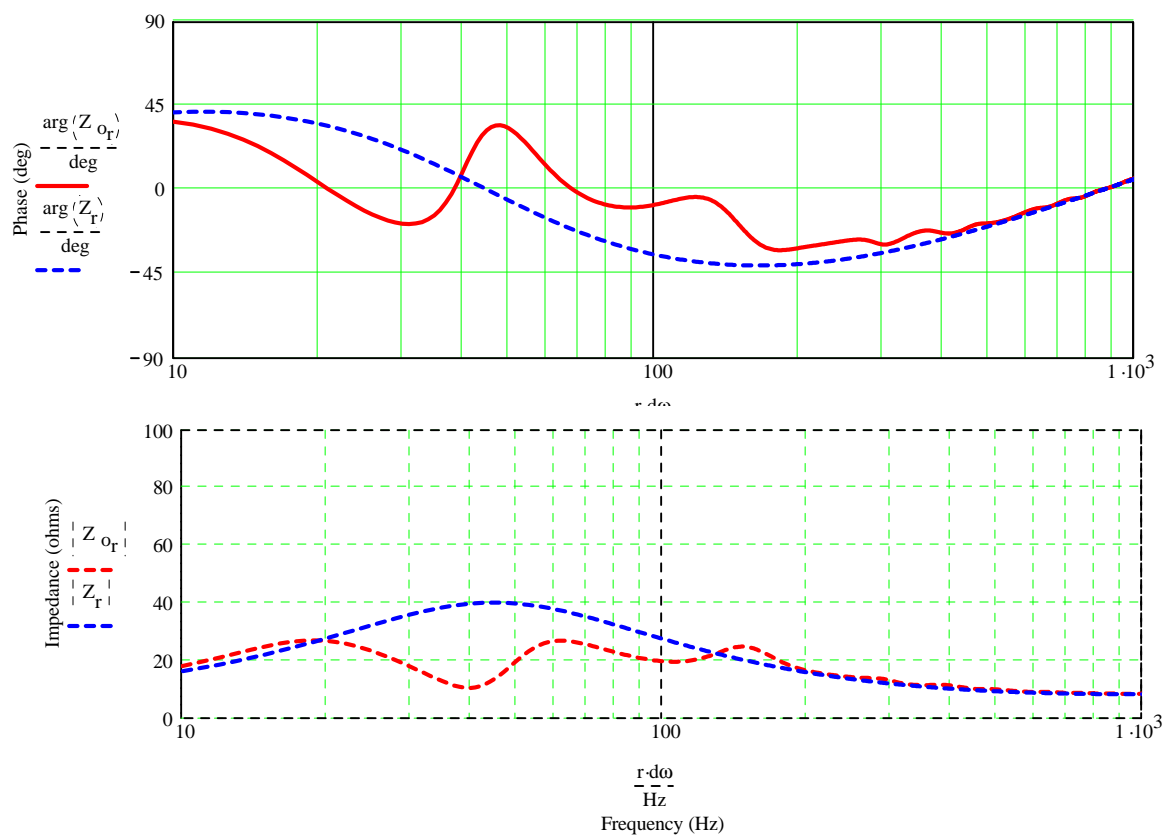


) DJ LH067UDQVP LVLRQ/ LQH6\ VMP DQG, QILQUM%DIIOH6 RXQG3 UHVXUH/ HYH5 HVSQRQHV

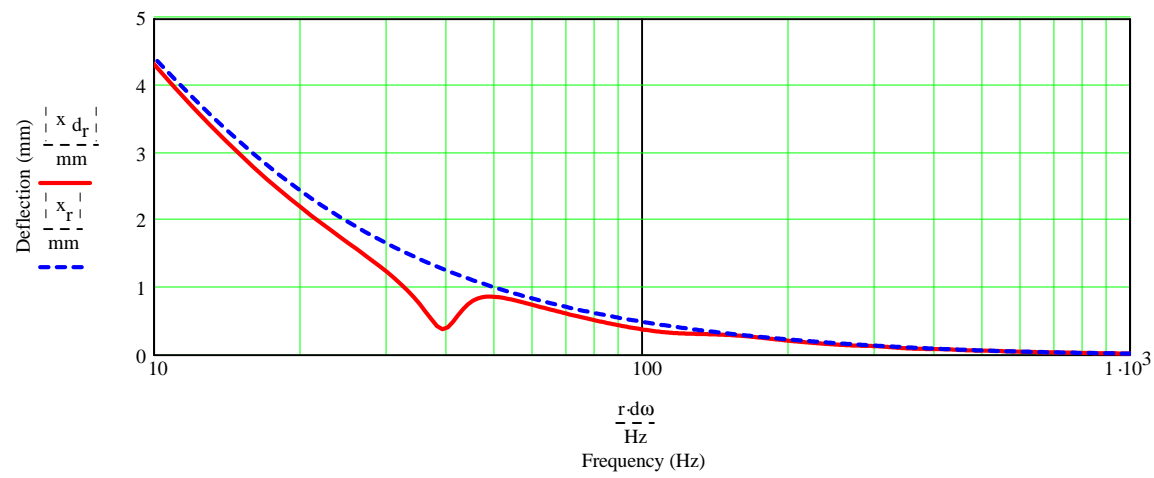


: RRIHUDQG7HLP LQXV) DJ LH066 RXQG3 UHVXUH/ HYH5 HVSQRQHV





: RRIHU LVSOFP HQW



6\ VMP 7LP H5 HVSQRVHIRUDQ,P SXQH,QSXW

