Stability studies using Bode's Frequency Plots.

For an Amplifier with feedback, we have

T. function: $A_{CL}(s) = \dfrac{A_o(s)}{1 + A_o(s)\beta(s)}$

We have defined $L(s)$ as Loop Gain $= A_o(s)\,\beta(s)$

or $L(j\omega) = A_o(j\omega)\,\beta(j\omega)$

$= |A(j\omega)\cdot\beta(j\omega)|\, e^{j\phi(\omega)}$ Phasor

$\phi(\omega)$ is the Phase angle

If $\phi(\omega_o) = 180^\circ$ Then $|A_o(j\omega_o)\,\beta(j\omega_o)|\cdot e^{j(180^\circ)}$

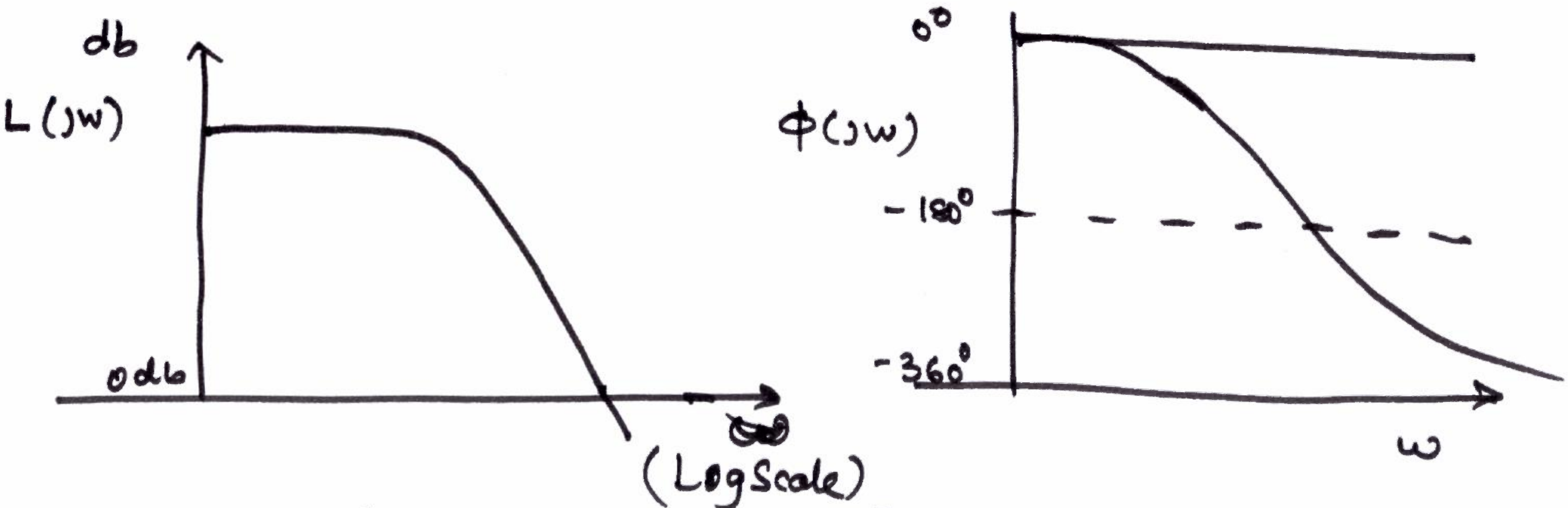
Which means $L(j\omega_o) = -\underline{\text{Real}}$

Thus we can say Positive feedback commences.

As then we observe that the Denomenator reduces $[1 - \{A(j\omega_0)\beta(j\omega_0)\}]$, and thence

Then $A_{CL}(j\omega_0) > A_0(j\omega_0)$ $\quad$ A_0 = openloop Gain.

This is the case of Positive feedback which will then make Amplifier Unstable.



Bode's Plot for Loop Gain

If this condition is met, the feedback system is said to be Stable

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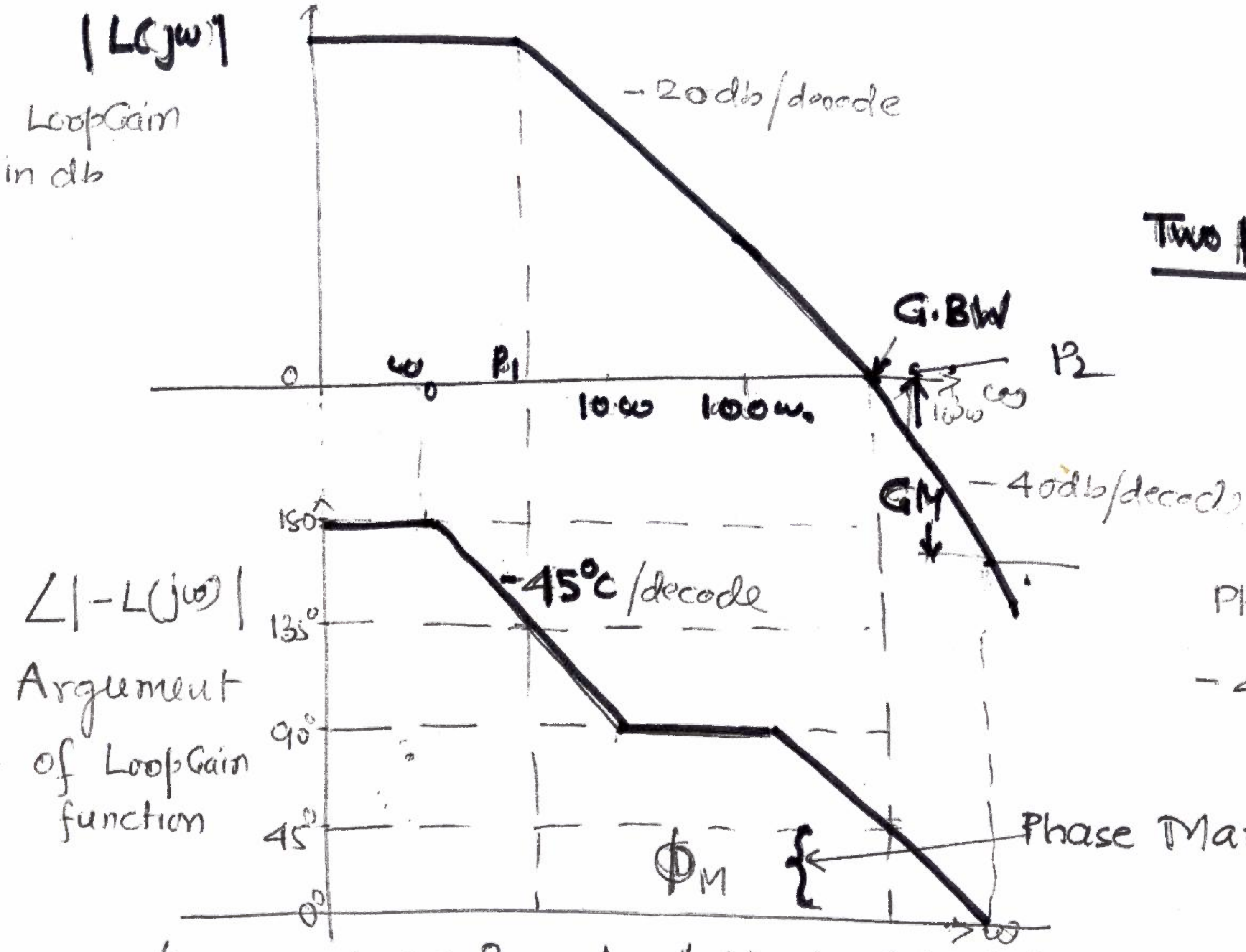
Two pole System



Phase goes as -45^0/decade

$$\phi_M = \pm 180^\circ - \text{Arg}\,|\,A(j\omega)\cdot\beta(j\omega)\,|$$

Stability looking from open-loop Bodeplot

$$\log(A\beta) = \log A - \underline{\log(1/\beta)}$$