

# Loading Effect in Feedback

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I am a student studying analog circuits and I am having hard time understanding loading effect in feedback.

Some books say when we cut the loop, we need to load the output of the opamp with feedback network beta and the opamp input behind it, but we can set the voltage (by the feedback) at the opamp input using an ideal voltage source.

Another book(Razavi's Analog CMOS book) says, that first we calculate the input impedance of beta with beta's output open. Then we load opamp output with this impedance. Then we calculate the output impedance of beta with beta's input shorted to ground. Then we add this impedance in series to the opamp input impedance. This is only for voltage-voltage feedback.

Is the first method not as good as the second method or are they essentially the same?

Another thing I have doubt is that when input/output impedance is modified by feedback, I suppose we must include the impedance added by feedback network beta, and then multiply  $(1+Ab)$  or  $1/(1+Ab)$ . But for the first method, it seems that the impedance contributed by feedback network beta at the opamp input is not taken into account, and that different impedance is added at the output, since the output is loaded with beta plus a opamp behind it, whereas in the second method it is loaded with beta with its output open.

I am sorry if my explanation is too confusing.

Thank you for reading my post.