

Re: current-mode opamps

Source: <http://sci.tech-archive.net/Archive/sci.electronics.design/2008-02/msg03407.html>

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 - *Date:* Tue, 26 Feb 2008 09:22:30 -0700
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On Sun, 24 Feb 2008 15:33:15 -0800, John Larkin
<jjlarkin@xxx> wrote:

I'm still trying to figure out current-mode opamps.

In a conventional opamp, the emitters of an input diff pair are fed by a current source, and the diff input voltage steers that current. In a current-mode opamp, the complementary input transistors have a small quiescent bias, but the non-inverting (bases) input signal invokes large collector currents, which are amplified all the way to the output. So in a sense we are getting information from the signal applied to a regular opamp, but we're extracting power from the input to a current-mode opamp. Which is why slew rates can be so high: more error loads the input signal harder, and drives the outputs harder, without running out of current.

If you look at this,

<http://focus.ti.com/lit/ds/symlink/th3201.pdf>

you'll see that the ni input impedance is spec'd as 780K + 1 pF. They also provide an S11 plot, which, after it's untangled, models as a high resistance shunted by about 2 pF or so, presumably because of extra C on the horribly-laid-out eval board.

OK, I have an open-drain (a phemt) with a 50 ohm pullup to, say, +2 volts. Unloaded, risetime is 100 ps or so. If it's then coupled to the THS3201 as a gain=+2 amp, the output falling edge is screaming fast, but rise is slow. Looking at the fet drain, it looks as if the pullup resistor is loaded by about 10 pF. Pig city.

So at large-signal swings, the input transistors are running out of beta as frequency goes up. That makes the input appear to be capacitive. That's not suggested by the input specs nor by the small-signal S parameters.

Tricky.

Re: current-mode opamps

John

The best design that CAD can provide... "it works in simulation",
"designed" by some engineer who has no soldering iron scars ;-)

...Jim Thompson

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