VIVO

A Popular CCS noise model to find delay change

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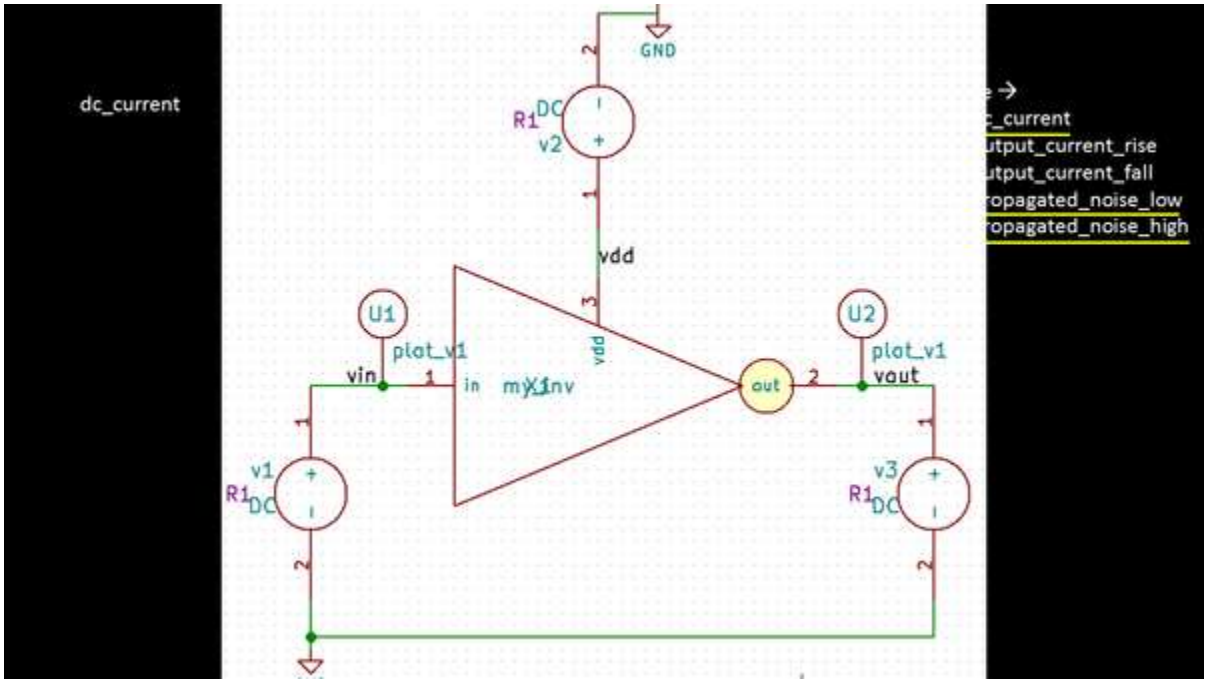
Its static though, but efficient….
I am referring to voltage-in-voltage-out VIVO model which is nothing but a current table as a function of input voltage level and output voltage level

Here's the setup to measure dc_current, a very popular pin-level group used for CCS noise modelling.



This needs a 2-dimensional DC sweep analysis, where input voltage is swept for a constant output voltage, and static current is measured at output node 'Vout' for each swept input voltage point. Next, we sweep output voltage by a unit, and again, the input voltage is swept for that new output voltage, while we dump dc_current scalar values for each combination of input and output voltage. Below is how it looks like:

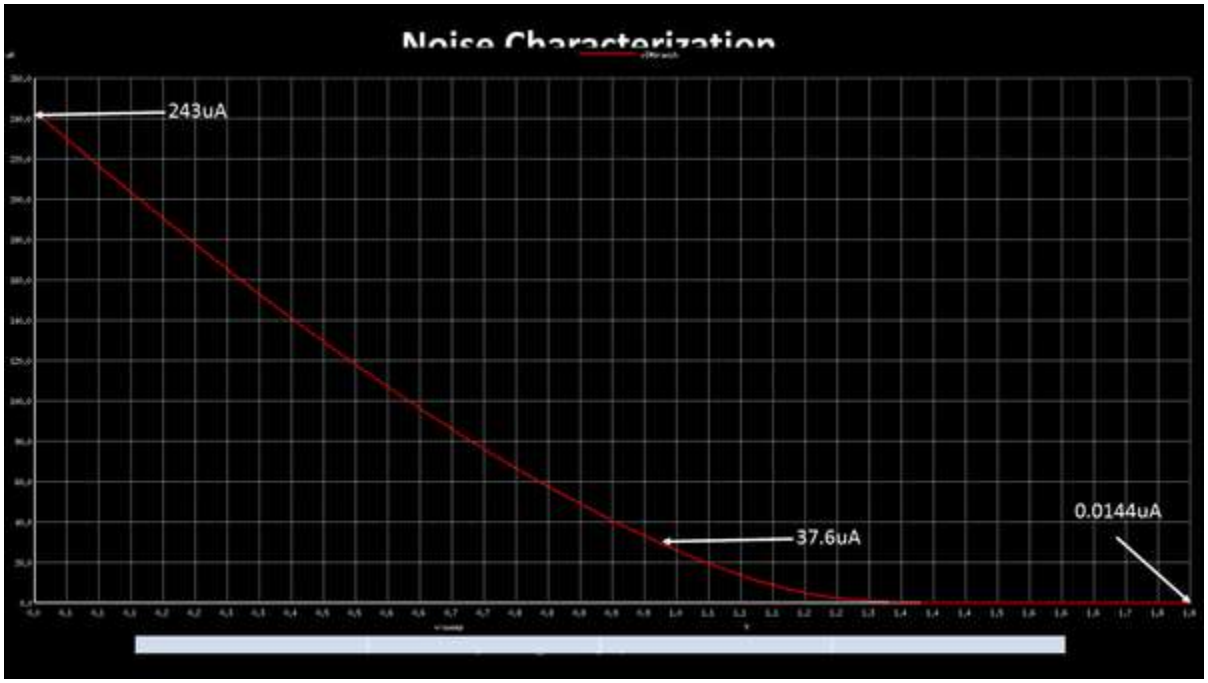
Noise Characterization

dc_current

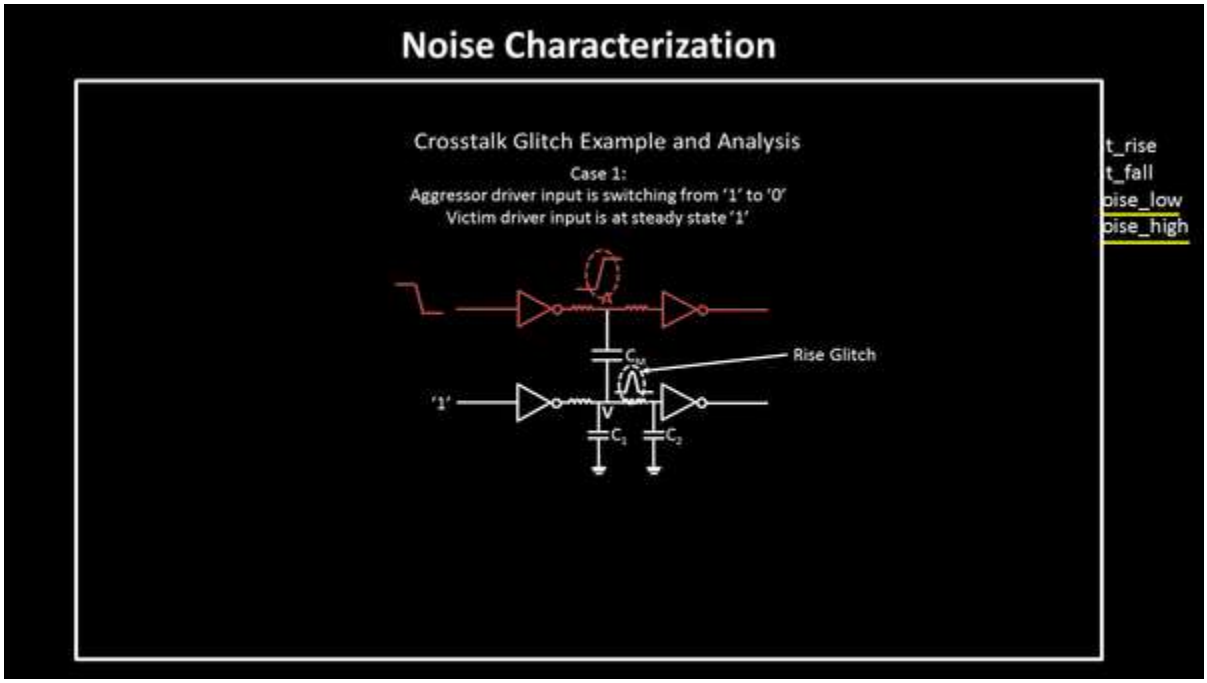
; true →
- dc_current
- rrent_rise
- rrent_fall
- d_noise_low
- d_noise_high

index1/index2	Vout = 0v	Vout = 0.9v	Vout = 1.8v
Vin = 0v	243uA	215uA	0.08uA
Vin = 0.9v	37.6uA	-23uA	-62uA
Vin = 1.8v	0.0144uA	-235uA	-251uA

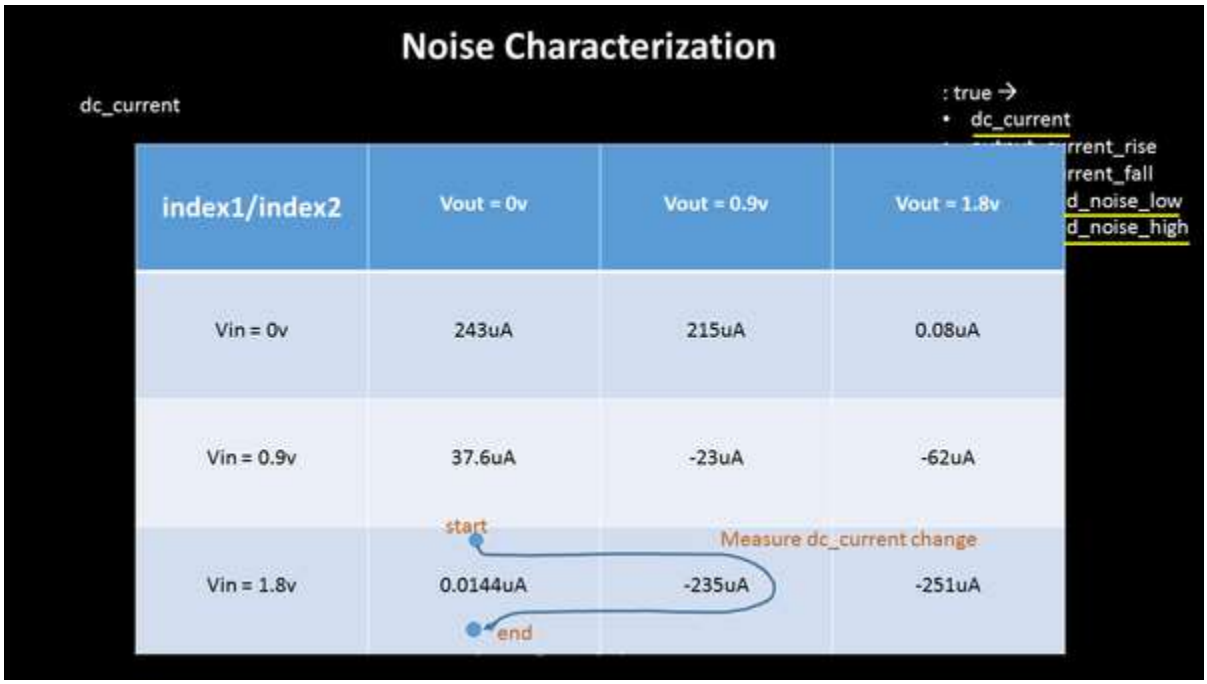
And below is a standard output of dc_current waveform, with Vout at 0v, while Vin is swept from 0v to 1.8v



So how will this be used? That's tricky…If you consider below image, where victim output which is supposed to be at logic '0', suddenly sees an c in its voltage level due to nearby aggressor attacking it. In such cases, you just need to keep on measuring current of respective vin and Vout.



And this is the path of dc_current measurement.



And once you have these values of dc_current, you just need to refer to timing model of that CCC and compute the delay change…Wasn't that a very difficult task, just made easy, by use of images?

I believe your job as an STA engineer or Physical design engineer is incomplete without the concepts of libraries, which I quote as 'the heart of STA, PNR, CTS and Crosstalk', in my course on "Library characterization and modelling – Part 1"