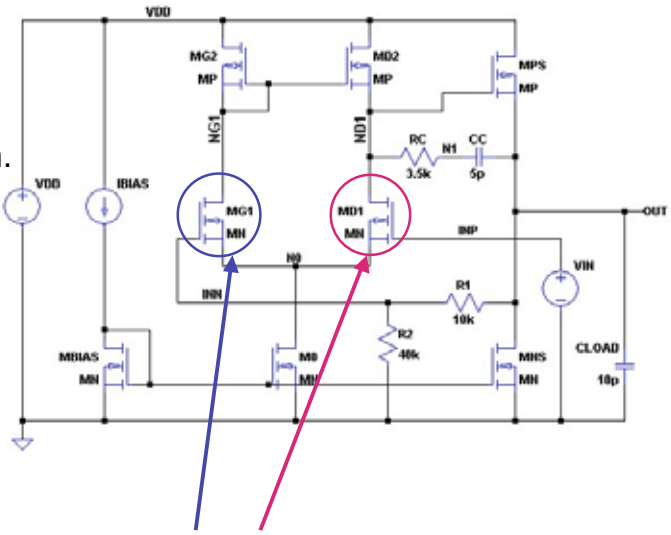
on-chip Dispersion diagnosed with SMASH

MEDAL Promotion Sheet

Circuit sensitivity to non-uniformities of fabrication process is a key issue for many analog signal processing circuits. The accuracy of their functions relies on the matching properties of certain devices. SMASH has unique capabilities for fast sensitivity to on-chip dispersion diagnostic without the burden of lengthy Monte Carlo analysis.

Key Features and benefits

- ✓ Enable **on-chip dispersion sensitivity** analysis on any design.
- ✓ **1,000 times faster than Monte Carlo** simulations at a minimum loss of accuracy!
- ✓ **Easy implementation** on any model parameter set without modifying the reference models
- ✓ Automatic implementation of **surface dependant dispersion parameters**
- ✓ Enables fast diagnostic by providing **individual component contribution** to local dispersion.
- ✓ Specially useful for circuits demanding accurate **offset calculation** or sensitive to any **mismatch**



Mismatch sensitive devices

- ✓ **Identify them**
- ✓ **Quantify the risk**
- ✓ **Act on it**
- ✓ **No Monte Carlo needed!**

DESCRIPTION OF THE SOLUTION

New deep-submicron processes are more and more sensitive to on-chip dispersion. SMASH offers an alternative to Monte Carlo simulations by adding intelligent local dispersion parameters to your models. Because it is much faster (a factor of 1,000 in average), the method enables huge productivity gains for design of sensitive circuits and enables a better yield for more designs where Monte Carlo is not applied by lack of time or resources.

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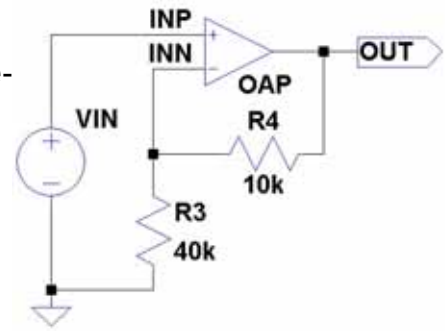
The parameters used by the dispersion models are added to the model parameter set thanks to the AKO (A Kind Of) mechanism without changing the reference model file. For better accuracy, SMASH takes into account the impact of the individual component area on the dispersion of its characteristics. The sensitivity to dispersion can be used on AC and DC analysis.

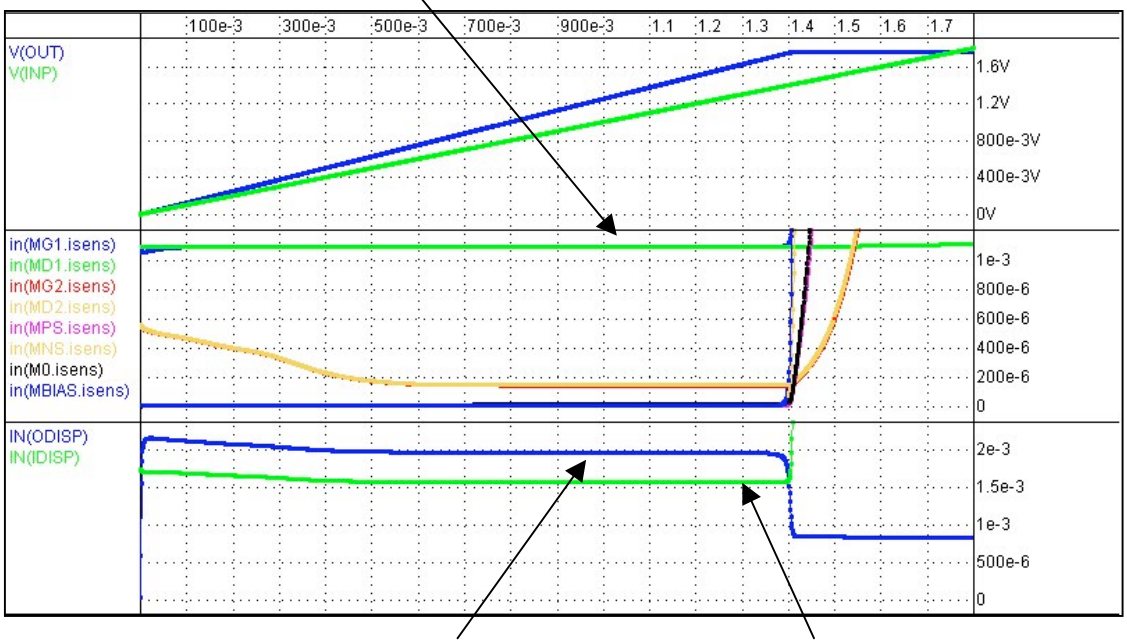
Can't afford Monte Carlo for offset simulation? Use sensitivity to on-chip dispersion with SMASH!

Speed (after Monte-Carlo optimization):

- In DC: ≈ 1,000 times faster than 1,000 Monte-Carlo runs
- In AC: ≈ 500 times faster than 1,000 Monte-Carlo runs



Contribution of MD1 MOS to the dispersion on V_{IN}



Equivalent dispersion on V_{IN} (Offset)

Dispersion on V_{OUT}

The sensitivity to dispersion analysis works as a noise analysis. It computes the standard deviation (rms sum) of all dispersion contributions at the output and computes the equivalent input dispersion at the specified input source.

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