EDA Tools for Analog IC Design
Performance Optimization and Reduced Design Time

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HEAD: Nuno Horta
Senior Member at IEEE, ACM and IT
Professor at Electrical and Computers Engineering Dept. in IST

TEAM:
4 PhDs (Nuno Horta, Nuno Lourenço, Ricardo Martins and Jorge Guilherme), 4 PhD Students, 8 MSc Students

RESEARCH AREAS:
Analog EDA, Analog IC Design, Intelligent Computation

PROJECTS:
More than 20 international and national projects

PUBLICATIONS:
Analog ICs - Application Domains related to THALES

Analog ICs are fundamental to establish the interface between the digital environments and the real world.

Application Domains:
- Space Exploration,
- Automotive Industry,
- Satellite Industry,
- Communication,
- Healthcare, etc.

[Defence – THALES]

[ExoMars – THALES Alenia Space]

[Transportation – THALES]

[Satellites – THALES Alenia Space]
Analog IC Design Automation

[Single Stage Amplifier with Gain Enhancement using Voltage Combiner, R. Póvoa et al., 2013]

AUTOMATIC

LAYOUT-AWARE SIZING PARETO FRONT

Design Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>area [μm²]</td>
<td>min</td>
</tr>
<tr>
<td>FOM [MHz·pF/μA]</td>
<td>≥ 1050</td>
</tr>
<tr>
<td>IDD [μA]</td>
<td>≤ 350</td>
</tr>
<tr>
<td>GDC [dB]</td>
<td>max ≥ 50</td>
</tr>
<tr>
<td>GBW [MHz]</td>
<td>≥ 30</td>
</tr>
<tr>
<td>PM [°]</td>
<td>≥ 60</td>
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Analog IC Design Automation: AIDAsoft
(www.aidasoft.com)

AIDAsoft
- R&D (Fully developed at IT/IST)
- Awarded EDA tool (SMACD 2015, ISCAS 2014)
- Innovative Layout-Aware Analog IC Sizing Met.
- Full Custom Automatic Layout Generation
- Interface with major CAD Environment and Simulators (ELDO, HSPICE and Spectre)
Analog and Mixed Signal IC Design

IC Design Examples:
- Pipelined A/D Converter
- Logarithmic A/D Converter
- Delta-Sigma Converters
- DC/DC Converters
- LNAs, LC-VCO, Class D Amplifiers, etc.

Multi-mode Stereo Class-D Amplifier Architecture

Test-chip Prototype
IT – THALES Alenia Space Cooperation

SCALES Project (2011-2014)

THALES Alenia Space (France)

• System-Level Design for Pipeline Data Converters

AIDA-C Project (2013-2016)

THALES Alenia Space (France)

• Circuit-Level Sizing and Optimization

• 5 MSc Co-Supervisions (2014/2015 and 2015/2016)
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