5  Analog IC Design Environment Architecture

Abstract. This chapter describes the implementation of an innovative design automation tool, GENOM which explores the potentials of evolutionary computation techniques and state-of-the-art modeling techniques presented in the previous chapters. The main design options of the proposed approach will be here described and justified. First, an overview of the design architecture main building blocks will be provided. Then, the optimization algorithm kernel, as well as, the implemented functionalities are described. Finally, the design options are described in detail using experimental results on a few test cases.

5.1  AIDA Architecture

The GENOM optimization tool can be used as a standalone application, although it holds some functionality which can only be fully accomplished when it is part of the in-house design automation environment called AIDA [1]. AIDA, Analog Integrated Design Automation, is an ongoing project for analog IC design automation at ICSG group IT/IST. A summary of this application architecture will be described next.

5.1.1  AIDA In-House Design Environment Overview

The AIDA platform, which includes a design flow core engine responsible for the design automation is illustrated in Fig. 5.1. The platform is structured in three layers: interface, application and data layer and implemented in several technologies, such as JAVA® for the design core, MySQL® for the databases and Swing® for the graphical user interface (GUI). The AIDA project implements a fully configurable design flow which introduces an increased level of flexibility and reusability when compared to traditional design approaches. The flexibility is achieved by both allowing the designer to define his own hierarchical design organization and, simultaneously, the design flow for each design. The reusability is achieved by introducing a highly organized data structure to store the entire design data allowing an easy reuse and retargeting of pre-design systems and predefined design flows. In addition, AIDA allows the interaction with other CAD tools such as circuit and system level optimizers like GENOM and layout generators [2-3].
Fig. 5.1 Conceptual view of AIDA environment architecture

The AIDA platform implements a hierarchical methodology matching designers’ approach by allowing the complete definition of the design flow tasks at each hierarchical level, as presented in Fig. 5.2 for a filter design case. The design flow definition is based on basic units of work: project specifications, topology selection, several units for device sizing and optimization and a last unit for characterization. In this project, GENOM acts as an external circuit and system level optimizer tool with well defined interface protocol.

Fig. 5.2 AIDA design flow