

System Simulation for M-Sequence Radar Sensors

Markus Robens, Ralf Wunderlich, and Stefan Heinen
Integrated Analog Circuits and RF Systems
RWTH Aachen University
Aachen, Germany
ias@rwth-aachen.de

ABSTRACT

Capabilities of M-sequence radar front-ends have been shown in the past. For further system enhancement, specifications of constituent components can be re-aligned using system simulation. In this article, we want to present a system simulation setup for Agilent's Advanced Design System (ADS) which allows us to assess the impact of individual components on typical radar parameters. The latter characterize the performance of the overall system and it is their optimization which is targeted. For this purpose, new ADS stars, i.e. components for the (timed) synchronous dataflow (TSDF) simulator, have been implemented. Appropriate antenna models have been identified from literature and the signal deformations they impose are clearly visible from the simulated impulse response. Thus, simulations help to determine the antenna type suitable for the application. Due to the multiple signal domain simulation ability of ADS Ptolemy, it can be switched from a pure model based simulation to a transient-TSDF co-simulation during the design process. Using an appropriate channel model, such simulations provide a good estimate of real system performance right in advance to the actual component implementation and they help to keep track of real components agreement with the predicted behaviour. Thus, a fair amount of flexibility is added in the design process compared to the former real-circuit component based approach.

KEYWORDS: M-sequence radar system, system simulation, system parameters, co-simulation.