SOLSTICE	Name of the post doc: **Omar BEHAR** Title of the post-doc: **Simulation of high temperature hybrid solar tower concentrating systems** Dates (start/end): 01/12/2016 – 31/01/2018
Supervisors	Alain FERRIERE & Yann VOLUT (PROMES-CNRS)

Context and objectives

The present study aimed at a detailed modeling and performance assessment of solar hybrid gas turbine-based power conversion systems. This includes the development of a tool for predicting the performance of CSP plants, investigation of various configurations based on performance indicators, comparison of various operation modes and operation strategies and the selection of the most suitable configuration that meet a given objective.

Approach

A modular modeling approach (Figure 1) is developed in which the components are modelled separately and then assembled according to each configuration. Key performance indicators have been selected for ranking the configurations such as overall efficiency, solar-to-electric efficiency, solar share and power production. The identification of the best suited configuration to satisfy a given objective is based on these indicators.

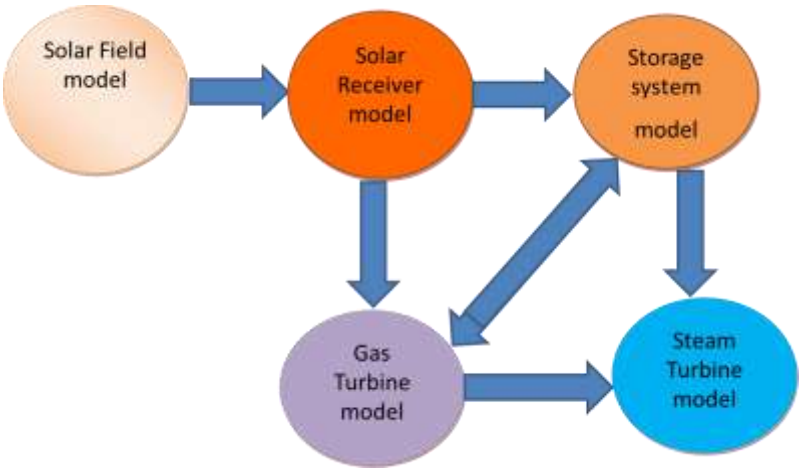

Figure 1. The concept of modular modeling approach to simulate various configurations

Main results

The different components are simulated and the results are compared to experimental results of the bibliography. Two examples are given hereafter for the pressurized air solar receiver (Figure 2) and the gas turbine (Figure 3).

1- Modeling the solar receiver

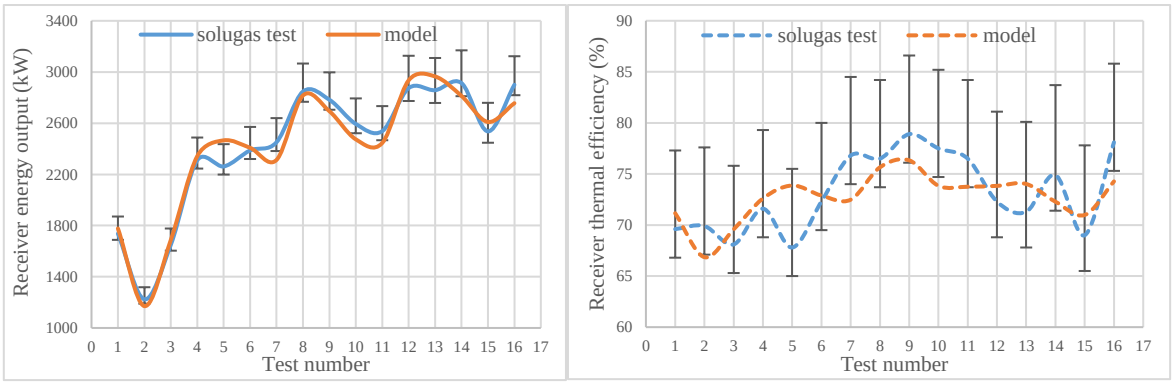

Figure 2. Comparison of predicted receiver performance and experimental results (solugas-project) with uncertainty bars: thermal energy output (left), thermal efficiency (right).

2- Modeling of the gas turbine using a modular approach and components performance maps

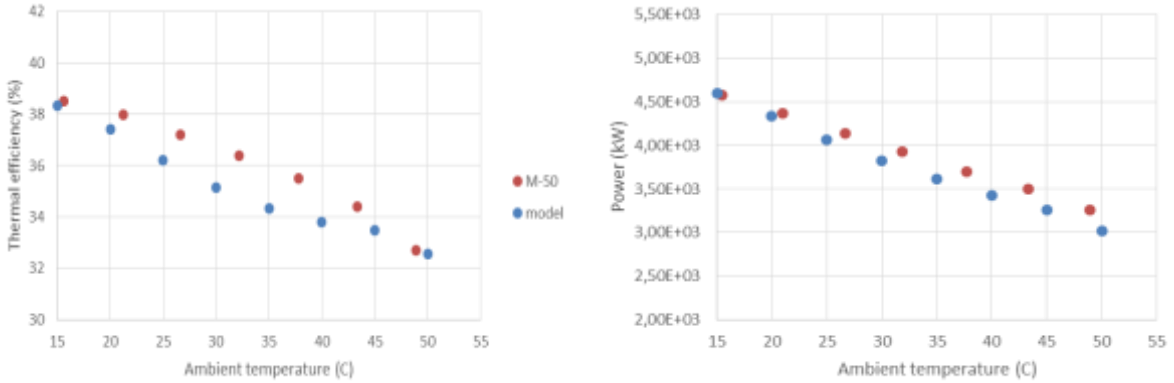

Figure 3. Comparison of the predicted GT performance and manufacturer data (Mercury 50 recuperated gas turbine).

Publications in international conferences

O. Behar, A. Ferriere and Y. Volut. Off design performance and operation strategies of hybrid solar gas turbine. *SolarPaces 2017,* Santiago du Chili (Chili), sept 26-29, 2017.