PhD in Energetics

Research Title: Modeling of concentrated solar power systems

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Context of the research activity
This research activity is focused on Concentrated Solar Power (CSP) systems. CSP is a renewable technology that exploits the solar radiation to produce high temperature thermal power, which can be converted in electricity by means of a conventional thermodynamic cycle. In a CSP plant, a number of reflectors (mirrors) concentrates the solar radiation on the surface of the receiver. The latter is, arguably, the key component of a CSP system, which transfers the energy of the concentrated solar beams to a heat transfer fluid (HTF), that in turn directly or indirectly drives the thermodynamic cycle. A thermal storage is typically included in the system to decouple the intermittent solar source from the power production. This feature makes the CSP technology extremely interesting, and indeed at present unique, among the renewables. Over the last few years the proponent group has established many collaborations, in Italy (ENEA, ...) as well as around the world (Spain, US, Australia, ...), with academia and research centers, but also increasingly with industry, working on different technologies (e.g., central towers, linear Fresnel, etc.), focusing on thermal-fluid dynamic modeling, contributing to a Horizon 2020 project and participating to experiments at the Plataforma Solar de Almeria.
The following publications can give the candidate an idea of the focus of the group past and current research interests.


Objectives

To develop, verify\validate and apply thermal fluid dynamic and thermomechanical models, both at component and system level, for the analysis, design, interpretation of test results and optimization of CSP systems, aimed at increasing their efficiency and reducing their cost.

Skills and competencies for the development of the activity

Strong interest for CSP.
Independence and proactivity.
Natural attitude to work and productively collaborate inside a group and/or with different players, including providing advice and guidance to MSc thesis students and contributing to tutorials in MSc classes on CSP.
Good command of the English language (German, Spanish a plus).
Very good knowledge of thermal fluid dynamics fundamentals, (thermo-mechanics fundamentals a plus, previous experience of CFD and/or system level codes, e.g. Modelica, a plus).
Previous experience in CSP a plus.