8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

NUMERICAL METHODS AND TECHNOLOGICAL SOLUTIONS FOR CSP SYSTEMS (UPDATED PROPOSAL FOR MS)

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Key words: Concentrated Solar Power, Computational Solar Engineering, Trough Concentrators, Heat Storage.

ABSTRACT

ENEA, on the basis of the Italian law n. 388/2000, has started an R&D program addressed to the development of CSP (Concentrated Solar Power) systems able to take advantage of solar energy as heat source at high temperature. One of the most relevant objectives of this research program [1] is the study of CSP systems operating in the field of medium temperatures (about 550°C), directed towards the development of a new and low-cost technology to concentrate the direct radiation and efficiently convert solar energy into high temperature heat.

The problems concerning the use of CSP technologies has been analyzed and reported by several authors: e.g. Sargent & Lundy [2] conclude that the CSP technology is a established and reliable solution for energy production, even if its major disadvantage is that the energy produced is at much higher costs than those required by fossil-fuels. Price et al. [3] discuss how a torque box design for parabolic trough collectors, an important aspect in concentrating solar thermal power plants in California, reduces weight and number of deformations of collector structures. Lüpfert et al. [4] discuss how the existing parabolic trough power plants are a capable and ever-growing technology and, thanks to improvements reached through R&D, it is likely that costs will consistently decrease while advantages and technology rapidly increase.

The basic elements of a concentrating solar power plants are: *i)* the parabolic-trough solar collector [5]; *ii)* the heat transfer fluid; *iii)* the thermal storage. Within the Italian context, ENEA has built an experimental facility (defined as PCS, "*Prova Collettori Solari*") at the Research Center of Casaccia in Rome, which incorporates the main proposed innovative elements.

This Mini-Symposium will attempt to address the main aspects of CSP technology based upon the contributed abstracts. All CSP technology related topics are welcomed, but the organizers hope to emphasize:

- Computational methods for assessing Parabolic Trough performances;
- Modern CSP technologies and technological advances;
- Structural response and assessment for steel components of Parabolic Trough solar concentrators;
- Technological and computational aspects of heat storage concrete systems for solar power plants.

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