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"Modeling and simulation of parabolic trough energy systems: optimization of energy production in solar fields and application"

Parabolic trough power plants (PTPP) are extensively used for electricity generation from solar radiations and considered one of the most cost-effective methods. The aim of this work is the modeling of the solar field of a PTPP and optimization of different system parameters related to the generated power output. The system is modeled using a set of nonlinear partial differential equations for transient, coupled thermo-fluid dynamic processes in a large 1D-network of pipes and coupled with the energy optimization problem. Advanced analytical, numerical and optimization techniques were adopted for the development of hybrid solutions of this type of models. Finally, numerical experiments are conducted to validate the presented model and then used in application of NOOR power plant in Morocco.