



FUZZY SWITCHING CONTROL OF THE COMPLETE OIL CYCLE OF SHIRAZ SOLAR POWER PLANT

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ABSTRACT—In this paper, fuzzy switching control of the complete oil cycle of Shiraz solar power plant is presented. So far, in the literature, only modeling and control of the collectors' field of a solar power plant, which is a part of the complete oil cycle, have been studied. According to various environmental conditions, input disturbances and design constraints in some components, changes of the oil cycle working loops become necessary which cause switching in the continuous system. To control such a complex system, two controllers are required: 1) a continuous controller to hold outlet oil temperature of the collectors' field at its desired level and 2) a switching (discrete) controller to determine the suitable loop to be activated. In this paper, a new approach for decision making on switching actions among various loops of an oil cycle is presented. Fuzzy switching is used to reasonably reduce chattering phenomena which may be caused by conditional switching. For the complete controller structure of the system, a combination of continuous and switching controllers is used: Fuzzy Logic + Fuzzy Switching.

Simulation results show that the applied control system can manage the oil cycle in different situations especially in the presence of large step disturbances (moving clouds) and white noise. By applying such a control system, performance of the oil cycle is improved and a more uniform power generation during a day is achieved.

Key Words: Solar power plant, Switching control, Fuzzy control, Fuzzy switching control