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This paper presents the behaviours of three-phase induction motor driving centrifugal pump under various solar irradiation levels, where the motor speed and torque depend on the source voltage and frequency, while the water-flow rate depends on the motor speed, density, and static head according to affinity flow. Matlab/ Simulink model is proposed for studying the behaviours of these machines with respect to water flow capacity, motor current, electromagnetic torque, and motor efficiency. The proposed photovoltaic with maximum power point tracking model based on observation and perturbation (O&P) maximum power tracking model is applied. The output voltage is regulated throughout Buck-Boost converter with purpose maintaining the output voltage at predetermined values. Since Induction motors are widely used in pump systems, the electromagnetic torque, water-flow rate are studied for various source frequencies. Comparison analysis is conducted for both motors with respect to water flow-rate, heads elevation, and motor current. In addition to

Abstract: motors with respect to water flow-rate, heads elevation, and motor current. In addition to that, the proposed system presents PV-Grid Integrated model, where the power shortage required for normally operation of the pump is drawn from the electrical grid.

**Keywords**: Induction Motor; Matlab/ Simulink; Photovoltaic; Buck-Boost Converter; Electrical Grids; Centrifugal Pumps, Variable Drives.