Dimitar Dimitrov
Faculty of Electrical Engineering, University "Sts. Cyril and Methodius" - Skopje

QUASI-STEADY BATTERY MODEL FOR APPLICATION IN PERFORMANCE ANALYSES OF PHOTOVOLTAIC SYSTEMS

ABSTRACT

In this paper, Copetti and Chenlo's dynamic battery model is modified into a quasi-steady model for use in performance simulation of photovoltaic systems. With the quasi-steady model, for a given time interval, when the battery charges or discharges with a constant current, it is calculated an effective value of the battery voltage. The modification is done assuming equality of the energy that the battery accumulates or and delivers, within a time interval, in dynamic and quasi-steady conditions. The equations for the effective battery voltage calculation are functions of: the length of the time interval, the charging or discharging current, the battery temperature and the battery state of charge at the beginning of the time interval. There are also obtained expressions for calculation of the maximal charging and discharging currents for a given time interval, which are a consequence of the used quasi-steady battery model. Here is also given an expression for calculation of the battery voltage in case of overcharging, when the battery is in the process of gassing.

Keywords: lead-acid batteries, quasi-steady battery model, photovoltaic systems.