

APPARATUS AND METHOD FOR RAPIDLY CHARGING BATTERIES

Abstract

An apparatus and methods for ultra-fast charging one or more batteries, including, for example, lithium ion batteries. A charging current is determined by optimization of a model based on functions of a set of internal state variables associated with a battery, and a set of model parameters or nonparametric data characterizing the battery. Instantaneous internal state variables are determined, and an optimized charging current is applied to the battery subject to a set of battery- specific constraints. Internal state variables are updated recursively based on behavior of the battery under charge as well as the behavior, stored in a database, or acquired via a network, of cognate batteries.

Fig. 5A