Predictive power control for electric vehicle charging applications

Abstract

This paper presents a direct predictive power control (DPPC) design for vehicle charging applications. The proposed control design allows working in the Park's reference frame avoiding the usage of the phase-lock loops, which help increasing the reliability of the system. Direct power control allows defining active and reactive power references as function of the control objectives independently. In the case of the active, it is defined as function of the battery current or state-of-charge desired profiles, while reactive power can be projected as function of the grid requirements. Numerical results show that the proposed DPPC allows controlling active and reactive power regardless with minimum steady-state errors (e r ≤ 1%); in addition, the state-of-charge and the battery currents are controlled to evidence the applicability of the proposed DPPC design for tracking different desired references. All the numerical test are performed in MATLAB/simulink.