**Long time simulation of LHC beam propagation in electron clouds** BING FENG, ALI GHALAM, University of Southern California, ELENA BENEDETTO, FRANK ZIMMERMANN, CERN, VIKTOR DECYK, WARREN MORI, UCLA, THOMAS KATSOULEAS, University of Southern California — In this paper we present three new simulation results of single-bunch instabilities caused by interaction of a proton beam with an electron cloud for the Large Hadron Collider (LHC). Our simulation was done using the QuickPIC code [1]. 1) We include the effect of dispersion in the equation of motion in the x direction, 2) We investigate the effect of the space charge of the beam on itself, and 3) we extend earlier modeling by an order of magnitude (from 50ms to 500ms) of beam circulation time. If dispersion is included the plane of instability changes. However, the total emittance is kept approximately the same. The effect of space charge is to change the emittance growth by less than a few percent. Results from longer runs suggest that the long term growth of electron cloud instability of the LHC beam cannot be obtained by extrapolation of the results of short runs.

Bing Feng
University of Southern California