Multi-Bunch Dynamics in RF Photoinjectors Through an Envelope Equation Approach,
M. FERRARIO, INFN-LNF; L. SERAFINI, INFN-MILANO - Free Electron Lasers application envisage the generation, acceleration and transport of trains of bunches with high charge, high repetition rate and low emittance. A numerical model already developed for these purposes [1] has been now extended to treat RF guns with proper description of the photocathode bunch generation. The model algorithm is based on a coupled integration of Newton and Maxwell equations under a slowly varying envelope approximation for the time evolution of higher order modes and an envelope equation description for the set of bunch slices. In this way beam loading effects and higher order modes excitation can be studied. The application to the TTF-FEL injector as a particular design is presented and the optimisation according to the invariant envelope concept is discussed.

[1]   M. Ferrario et al., Part. Acc., 52 (1996) 1-30, or pdf version in http://ares.lnf.infn.it