Abstract

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"Study and development of fine synchronization algorithms for multicarrier signals in presence of multipath: applications to the navigation systems in urban environment”

In the last few years the regarding navigation satellite systems have become greater importance, this because of the increasing needs from the fields where they can be employed. In the transports, military, and emergency fields, the user’s needs are related to systems able to evaluate the exact users position at any moment, whatever the latitude and condition. One of the particularities of the Galileo System consist of multicarrier transmission modality that it would allow improvements to the quality of the service.

The aim of this thesis is studying the possibility to develop signal fine able to improve performances in a urban environment. In particular to kinds of bi-frequency receivers are proposed: both are taking advantage of the frequency diversity and data fusion methods, allowing optimal performances of synchronization in an area where noise and multipath effects slow to be particularly hostile.

Performances of the algorithms have been studied by using a satellite simulator system, able to model all the Galileo system characteristics. The introduction of the bi-frequency approach along with data fusion block causes a more complex system so that an additional hardware is needed. The proposed algorithms also guarantee optimal performances as well as the reduction of multipath effects and ionospheric error.