Abstract

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"Development and evaluation of satellite navigation systems' performances in open field railways environment"

The European railway transport is crossing in these last decades a deep demand crisis, above all because of an objective lack of services offer adequate to modern users. To relaunch this sector, it has been started a project of deep modernization of the whole apparatus, trying to exploit what modern technologies have at their disposal.

At this purpose, the same thesis demonstrate whether, how and into which terms it could be possible to use the satellite navigation systems as an alternative to other already experimented systems, as a goal to solve into an appropriate way one of the most pressing problems of the railway transport, such as the position and the speed survey of a train, so that it could be possible, by adequate elaborations by a base station, to make its march the mostly automated.

This compared with the fact that speeds at stake onto the ultimate and next generation trains don't let a human on-board operator to be able to verify the safety signals along the way, or to react within an acceptable reflex time to emergency situations that could happen during the march.

At this aim it has been developed, using MATLAB 6.0 language and SIMULINK libraries, a simulator of a GPS transmitter, of a time varying channel and of a GPS receiver projected ad hoc for the railway environment users; the latter's performances have been evaluated varying the imposed conditions onto the same channel.

Peculiarly, these performances have been studied into open field conditions, i.e. in absence of refractive obstacles onto the signal and into general atmospheric conditions, concerning with a maximum speed of 500 Km/h. Finally an application of GPS has been proposed and simulated to verify the integrity of a running train.