

Postdoc post proposition M/F, fixed-term contract of one year



Subject Separation of VHF GMSK signals received by a low orbit satellite

Context In order to secure the sea traffic, the International Maritime Organization (IMO) set up a communication standard between the ships which is called Automatic Identification System. Using informations obtained through the GPS protocol, the AIS standart makes it possible to communicate these informations between the ships which are on the sea. Therefore, the knowledge of position, velocity or identification status between the ships should not be collided. Based on a GMSK modulation, the AIS messages are sent on VHF propagation channel at regular intervals. To avoid the occurences, these messages are time multiplexed using a technology called SOTDMA [1]. The sea security and the collision avoidance is more and more important for international authorities because of the growing traffic. The sea security is managed by coast guards using means of visual observation, audio exchanges, radar and more recently of satellite observation. Also, several countries use, or plan to use, base stations in order to receive AIS messages through a satellite link [2].

Objectives In this study, we are interested on the AIS messages reception by a low orbit satellite. As said before, the AIS signals are time multiplexed and organized within 40 nautical miles cells. But, considering the reception by a satellite, this time organization is not yet valid and collision of AIS messages can occur during a time slot. In order to demodulate the AIS messages, we have to separate the received signals by using the link (propagation channel) and the transmitter (LO frequency, temporal shift, location) parameters.

The main steps of the study are:

1. Bibliographic work: asynchronous GMSK reception with multiple users, reception processing through tensor approach, parametric estimation considering the problem of the AIS source separation;
2. Algorithmic implementation using Scilab software to achieve the demodulation and the estimation of parameters;
4. Robustness of the algorithms;
5. Global perspectives.

[1] ITU-R M.1371-2, *Technical characteristics for a universal shipborne automatic identification system using time division multiple access in the VHF maritime mobile band*. ITU Radiocommunication recommendation, 2006.

[2] ITU-R M.2084, *Satellite detection of automatic identification system messages*. ITU Radiocommunication report, septembre 2006.

Key words GMSK modulation, multiple user detection, parametric estimation, joint and blind estimation, algebraic multilinear methods.

Profile of candidate PhD in Signal processing (estimation, multilinear algebra), telecommunication (multiuser, GMSK).

Deadline for application submission Send detailed CV, covering letter, flyleaf and outline (table of contents and abstract) of the PhD dissertation (PDF format) before August, 21st, 2009.

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Gross monthly salary 2300 €

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