LATEX_tools : a software package for navigation in a Lagrangian reference frame

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The LATEX (LAgrangian Transport EXperiment) project aims to study the influence of coupled physical and biochemical dynamics at the (sub) mesoscale on matter and heat transfers between the coastal zone and the open ocean. One of the goals of the oceanographic field experiment Latex10, conducted during September 2010 in the Gulf of Lion (NW Mediterranean), was to mark a mesoscale feature by releasing a passive tracer (SF6) toghter with an array of Lagrangian buoys. In order to release the tracer in an initial patch as homogeneous as possible, as well as to study its mixing and dispersion minimizing the contribution due to the advection, it was necessary to continuously adjust the vessel route to keep our observations in a Lagrangian reference frame moving with the studied dynamical structure. To accomplish this task, we developed the "Lagrangian navigation" software presented here.

The algorithm is based on the following steps: i) real-time acquisition of the positions of the buoy released at the array's center and of the vessel by Iridium satellite communication and by the on-board GPS, respectively; ii) resolution of a simple system of ballistic equations projecting a pre-designed route in the moving frame, iii) calculation of the navigation instructions for the bridge with an interactive graphical output.

The software is equipped with a series of graphical and user-friendly accessories and the entire package can be freely downloaded from the LATEX web site http://www.com.univ-mrs.fr/LOPB/LATEX.

As practical example, the use of the software during the Latex10 cruise is presented and discussed.