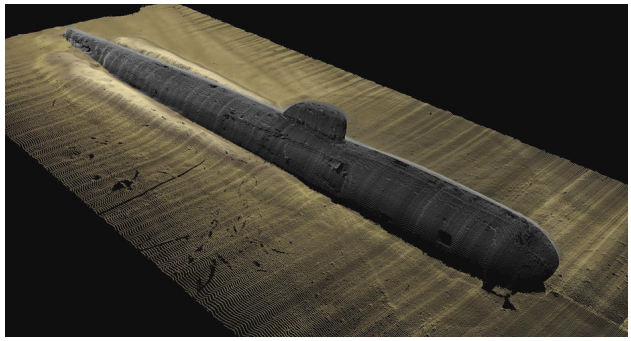
DTU Informatics
Department of Informatics and Mathematical Modeling

Fast Large-scale Banded Solver on the GPU

Background:



Modern sonar systems are complex systems utilizing a series of technologies to allow a mapping of the sea-floor with an accuracy better than 3 cm in all kinds of weather. The validation of these systems are often done using actual sea measurements of well known areas. To improve the validation, we are simulating the interaction of a sonar pulse with the seabed. This simulation requires inversion of many band matrices of 200.000 by 200.000 in size, which take a lot of time to process. To speed this up, this process is moved from a CPU to a GPU.

Project description:

A parallel implementation of a linear solver for large banded matrices is to be developed for a many-core GPU architecture. To date such a specialized algorithm does not exist for GPUs. We propose to generalize current efficient tri-diagonal solvers for GPUs to a solver for banded matrices. The sparse data format DIA is to be used. Such an implementation is of great interest in many application areas in addition to the one mentioned above. The project has potential for writing a subsequent research publication.

Requirement and profile:

The project will be developed in the CUDA C language. Good skills in C or C++ programming is therefore required in addition to reasonable knowledge of numerical linear algebra and modeling. Knowledge of wave phenomenon or physics related to sonar measurement is not required.

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