Seismic Survey Simulation and Imaging in 3D

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Abstract

Current distributed computing systems allows the simulation of very large seismic surveys consisting of thousands of sources and receivers pairs by using the full wave equation. Imaging, such as Reverse Tome Migration, also has similar requirements. The clock time required, though, is still fairly significant and it is of interest to see if can be reduced.

In previous work we have shown that Model Order Reduction applied to the 2D acoustic wave equation could produce speed-ups of one order of magnitude when applied to these problems. In principle, there are no conceptual difficulties in extending these techniques to 3D. However, the constraints in existing applications makes it more challenging due to the large size simulations involved and the fact that one is restricted to work in a single multicore box for each source-receiver pair.

Even with upper end machines, there are difficulties and we will discuss in this talk some proposed alternatives to existing algorithms.