

# Performance Analysis of FEM Algorithms on GPU and Many-Core Architectures

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## ABSTRACT

The roadmaps of the leading supercomputer manufacturers are based on hybrid systems, which consist of a mix of conventional processors and accelerators. This trend is mainly due to the fact that the power consumption cost of the future cpu-only Exascale systems will be unsustainable, thus accelerators such as graphic processing units (GPUs) and many-integrated-core (MIC) will likely be the integral part of the TOP500 (<http://www.top500.org/>) supercomputers, beyond 2020. The emerging supercomputer architecture will bring new challenges for the code developers. Continuum mechanics codes will particularly be affected, because the traditional synchronous implicit solvers will probably not scale on hybrid Exascale machines. In the previous study [1], we reported on the performance of a conjugate gradient based mesh motion algorithm [2] on Sandy Bridge, Xeon Phi, and K20c. In the present study we report on the comparative study of finite element codes, using PETSC and AmgX solvers on CPU and GPUs, respectively [3,4]. We believe this study will be a good starting point for FEM code developers, who are contemplating a CPU to accelerator transition.

## REFERENCES

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