Development of a Highly Parallel BEM-Solver

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Nowadays, Virtual Prototyping and therefore simulation technology is an indispensable part of most product development cycles. The steadily increasing demand for better, cheaper and more reliable products requires state-of-the-art simulation software to keep up with the competition. While the Boundary Element Method (BEM) is a great advantage over the Finite Element Method (FEM) in certain situations, there is still room for improvement implementation-wise. 1 tested the hypothesis that the BEM will profit from being implemented on a massively parallel architecture. Compared to FEM on a single CPU (16C@3.4GHz), the BEM implementation running on the CPU and 4 GPUs(4096 CUs) achieved a 7500x speedup factor, while the difference between the analytical solution and the numerical BEM solution was negligible (<0.1dB). The study showed that the BEM is inherently suitable for a scalable and highly parallel implementation. Furthermore, the advantage of higher-order elements over the classical constant elements was demonstrated.

Awards Won:

Third Award of $1,000