AXC: A new format to perform the SpMV oriented to Intel Xeon Phi architecture in OpenCL

**Título**  
AXC: A new format to perform the SpMV oriented to Intel Xeon Phi architecture in OpenCL

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**Abstract**  
Emerging new architectures used in High Performance Computing require new research to adapt and optimize algorithms to them. As part of this effort, we propose the new AXC format to improve the performance of the SpMV product for the Intel Xeon Phi coprocessor. The performance of the OpenCL kernel, based on our new format, is compared with three very different and high efficient sparse matrix formats, i.e., CSR, ELLR-T, and K1. We perform tests with most of the matrices from the Williams collection used to test SpMV kernels for GPUs architectures in several related works. The numerical results show that the AXC format is more robust to spatial indirections proper of sparse matrices and prefers matrices with low variability amongst their rows' population, very much like matrices originated by FEM codes. The Conjugate Gradient (CG) is implemented in OpenCL using all the formats in this work to expose strengths and weaknesses of the formats in a real application. The CG implementation shows that the AXC has the fastest conversion time and it is coherent with the numerical results generated by the SpMV tests, and that the format has a slower memory operations time due to an extra step required by the format and its larger memory footprint.

**Palavras chave**  
conjugate gradient, coprocessor, OpenCL, sparse matrix format, sparse matrix vector product, Xeon Phi

**LIGAZÓNS**

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