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Application of heterogeneous computing techniques for image-based hot spot detection

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Improving image processing systems is key to plasma diagnostics. The operation conditions of ITER and the future machines require changing the role of such systems from monitoring and archiving for offline post-processing to real-time processing for machine control. Another purpose for these systems is machine protection. A relevant application of vision diagnostics is the wall and divertor temperature monitoring with hot spot detection. However, algorithms for hot spot detection are computationally complex. To achieve real-time performance at the required time resolution for all these experiments, evaluation and validation of the newest technologies is vital.

This work applies heterogeneous computing techniques based on OpenCL to the real-time hot spot detection problem. OpenCL improves portability, evaluation and validation on the development phase, and it also helps to execute each part of the algorithm in the platform that is best suited for it. The proposed solution balances the computational load between an FPGA, a GPU, and a CPU. The algorithm has been adapted, partitioned and optimized taking profit on the particularities of each platform.

Minioral

Yes

IEEE Member

Yes

Are you a student?

No

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