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Solving a kind of boundary-value problem for ordinary differential equations using Fermi – the next generation CUDA computing architecture.

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Summary: The aim of this paper is to show that a special kind of boundary value problem for solving second-order ordinary differential equations can be efficiently solved on modern heterogeneous computer architectures based on CPU and GPU Fermi processors. Such a problem reduces to the problem of solving a large tridiagonal system of linear equations with an almost Toeplitz structure. The considered algorithm is based on the recently developed divide and conquer method for solving linear recurrence systems with constant coefficients.

Keywords: parallel algorithms; tridiagonal systems of linear equations; GPU-based computing; numerical examples; boundary value problem; second-order ordinary differential equations; Toeplitz structure; divide and conquer method

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