

APPLICATION DRIVEN DEVELOPMENT OF SOME USEFUL FAST ALGORITHMS FOR PDEs

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Abstract: In this paper we describe some useful serial and parallel algorithms for fast and accurate evaluations of some singular integrals in regular geometries in real and complex planes. We then show their applications in developing fast and accurate methods for solving elliptic partial differential equations using Green's function approach in regular and complex geometries. These algorithms have been applied by the author and his collaborators in solving some practical problems from quasiconformal mapping to computation of pulsatile blood flow in eccentric catheterized artery. Some numerical results are presented in this paper. We describe many other possibilities in the use of these algorithms and also describe other areas where these algorithms have been applied by others. We chart the landscape where further opportunities for their applications exist. This talk will be partly based on the following papers of the author, some solo and some written with my colleagues. I thank all these colleagues for having collaborated with me on all these papers.

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