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Convolution Quadrature for the quasilinear subdiffusion equation

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We construct a Convolution Quadrature (CQ) scheme for the quasilinear subdiffusion equation and supply it with the fast and oblivious implementation. In particular we find a condition for the CQ to be admissible and discretize the spatial part of the equation with the Finite Element Method. We prove the unconditional stability and convergence of the scheme and find a bound on the error. As a passing result, we also obtain a discrete Grönwall inequality for the CQ, which is a crucial ingredient of our convergence proof based on the energy method. The paper is concluded with numerical examples verifying convergence and computation time reduction when using fast and oblivious quadrature.

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