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FINANCIAL REGRESSION AND ORGANIZATION

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Abstract. A central element in organization of financial means consists in the constitution, analysis and optimization of portfolios. As in many processes in nature, technology and economy, financial processes suffer from stochastic fluctuations and noise. Therefore, we consider *stochastic differential equations* [19]. As a drawback, these equations are often hard to represent and to resolve. We express them in simplified manner of approximation by discretization and additive models based on splines. This altogether defines a trilevel problem consisting of an optimization and a representation problem (*portfolio optimization*), and a parameter estimation that we base on [22,23]. We construct a penalized residual sum of squares model and face parametric nonlinearities by Gauss-Newton's and Levenberg-Marquardt's method for determining the iteration steps. We also investigate the related Tikhonov regularization problem and treat it using continuous optimization techniques by the elegant framework of conic quadratic programming. These convex problems are well-structured and, hence, they permit the use of the efficient *interior point methods* [30].

Keywords. Stochastic Differential Equations, Parameter Estimation, Conic Quadratic Programming, Stochastic Control, Trilevel Problem.

AMS (MOS) subject classification: 37N40, 60H10, 90C25, 91B28.

1 Introduction

This paper is devoted to a modeling of financial processes which may serve as a basis of analysis and structural investigation. An important expression