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NEW FORECASTING SCHEME USING QUANTUM MINIMIZATION TO REGULARIZE A COMPOSITE OF PREDICTION AND ITS NONLINEAR HETEROSCEDASTICITY

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Abstract. *A hybrid BPNN-weighted GREY-C3LSP prediction (BWGC) is performed very well for resolving the overshoot phenomenon significantly, but it definitely deteriorates the predictive accuracy once the volatility clustering occurs. Thus, we propose a new scheme to incorporate non-linear generalized autoregressive conditional heteroscedasticity (NGARCH) into BWGC prediction, which is optimally regularized by quantum minimization (QM), in such a way that the composite model, BWGC/NGARCH, can overcome the problem of volatility clustering substantially. In comparison with forecasting performance of several notable prediction methods, the proposed one can get the best predictive accuracy in two typical experiments.*
Keywords: Hybrid BPNN-weighted GREY-C3LSP prediction, Non-linear generalized autoregressive conditional heteroscedasticity, Quantum minimization

1. **Introduction.** The overshoot phenomenon [1] leads to big residual errors in grey prediction [2]. In order to reduce the overshoot effect and increase the predictive accuracy, a cumulated 3-point least squared linear prediction (C3LSP) [1] is employed to generate an underestimated output that is used to offset an overshoot result at the same period. Furthermore, a back-propagation neural network (BPNN) [3] is introduced to adjust between a grey model and a cumulated 3-point least squared linear prediction linearly, and the abbreviation of this hybrid BPNN-weighted GREY-C3LSP prediction is denoted by BWGC [2] in the following paragraphs and sections. BWGC hopefully can yield the