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IDENTIFICATION OF ERRORS-IN-VARIABLES MODELS VIA EXTENDED GENERALIZED LEAST-CORRELATION METHOD

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Abstract. *In this paper, a consistent estimation method for "errors-in-variables" (EIV) models is studied. The extended generalized least-correlation (EGLC) method has been proposed for the EIV models identification in the case where the input and output measurements are corrupted by white noises. To obtain more stable and accurate estimates, we introduce the prefilter and the extended vectors. It is expected that the proposed EGLC method can give more stable and more accurate estimates because the regression vector is more correlated with the filtered and the extended regression vector. The results of a simulated example indicate that the proposed algorithm provides good estimates.*
Keywords: Identification, Errors-in-variables models, Least-correlation method, Instrumental variable method

1. **Introduction.** Many identification methods are based on the assumption that the input measurements are noise-free. However, this condition is not satisfied in most practical situations. In the presence of input noises, those methods have been shown to give erroneous results. The systems where the measurement noises are present on both the inputs and outputs are usually called "errors-in-variables" (EIV) models [1].

In the EIV models identification, the least-squares (LS) method gives biased parameter estimates. To solve this bias problem, the instrumental variable (IV) methods [2, 3] and the bias-compensation principle based methods such as the bias-compensated LS (BCLS) methods [4, 5, 6, 7, 8, 9, 10, 11, 12] and the bias-eliminated LS (BELS) methods [13, 14, 15, 16, 17] are often used.

Recently, the least-correlation (LC) method [18], which is based on the minimization of the auto-correlation function of the equation error, has been proposed for the EIV models identification. The LC method can be applied in more general noise conditions by choosing the correlation lag so that the regression vector is uncorrelated with the composite noise. However, choosing the correlation lag so that the regression vector is uncorrelated with the composite noise leads to poor accuracy and stability of the estimates since the regression vector is less correlated with the delayed regression vector.

In this paper, the extended generalized least-correlation (EGLC) method is proposed for the EIV models identification in the case where the input and output measurements are corrupted by white noises. To obtain more stable and more accurate estimates, we introduce the prefilter and the extended vectors. The LC method can be generalized via