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Estimation for vector linear time series models

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This thesis is concerned with asymptotic properties of estimation in various models for vector time series observed in discrete time. Each model considered is taken to depend on a finite number of parameters. The estimation of these parameters is achieved by maximising the gaussian likelihood (or spectral equivalents to this likelihood) although gaussianity is not required for any of the results presented. Chapter 1 gives a brief introduction to the theory of multiple time series and each model covered in the thesis is introduced. The first part of this thesis (Chapters 2, 3, 4) is concerned with stationary series. In Chapter 2 the strong law of large numbers and the central limit theorem for estimators of the parameters specifying a general class of stationary ergodic non-deterministic time series models are established. In Chapter 3 the auto-regressive moving average model is introduced. There, aspects of identification and suitable "topologies" for the parameter space are discussed. Following this the strong law of large numbers and central limit theorem are established, under quite general conditions. In Chapter 4 signal plus noise models are discussed. There the signal and noise are taken to be stationary vector sequences of the type discussed in Chapter 2. Also in Chapter 4 an extension of the central limit theorem of Chapter 2 is given. A brief section is also devoted to the special case of a scalar autoregressive signal observed with white noise. The second part of this thesis, Chapter 5, is concerned with multiple linear regression models in which the residual vector is taken to be a stationary process of the type discussed in Chapter 2 or is taken to be an autoregressive moving average.

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There the strong law of large numbers and the central limit theorem for the parameters specifying the residual process and the regression coefficients are established under general conditions.