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A LATTICE OF COMPACTIFICATIONS OF UNIFORMLY CONTINUOUS MAPPING

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Let $f:(X,\mathscr{U})\to(Y,\mathscr{V})$ be uniformly continuous mapping. A mapping $cf:(cX,c\mathscr{U})\to(Y,\mathscr{V})$ is called *compactification* or *uniformly perfect extension* of the mapping f if the following conditions hold: 1)$X\subseteq cX$; 2) $[X]_{cX}=cX$; 3)$cf|_X=f$; 4) cf is a uniformly perfect mapping.

Theorem 1. *Let $f:(X,\mathscr{U})\to(Y,\mathscr{V})$ be a uniformly continuous mapping. Then the following conditions are equivalent:*

(1) *A mapping f is uniformly perfect.*

(2) *A mapping f is precompact and for any compact extension $(b_cY,b\mathscr{V}_c)$ of a uniform space $(Y,\mathscr{V})$ the mapping $\beta_s f$ satisfies to the condition $\beta_s f(\beta_s X\setminus X)\subseteq b_cY\setminus Y$.*

(3) *A mapping f is precompact and the mapping $\beta_s f:(\beta_s X,\beta\mathscr{U}_s)\to(\beta_s Y,\beta\mathscr{V}_s)$ satisfies $\beta_s f(\beta_s X\setminus X)\subseteq\beta_s Y\setminus Y$.*

(4) *A mapping f is precompact and there is a compact extension $(b_cY,b\mathscr{V}_c)$ of a uniform space $(Y,\mathscr{V})$ such that for the extension $\beta_s f:(\beta_s X,\beta\mathscr{U}_s)\to(b_cY,b\mathscr{V}_c)$ of the mapping f the inclusion $\beta_s f(\beta_s X\setminus X)\subseteq b_cY\setminus Y$ holds.*

Theorem 2. *There is an isomorphism $G:(K(f),\leq)\to(C(f),\subseteq)$ between the partially ordered sets $(K(f),\leq)$ and $(C(f),\subseteq)$.*

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Matrices whose inversions are tridiagonal, band or block-tridiagonal and their relationship with the covariance matrices of a random Markov processes (fields)

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The article discusses the matrices of the A_n^1, A_n^m, A_N^m forms, whose inversions are: tridiagonal matrix A_n^{-1} (n - dimension of the matrix), banded matrix A_n^{-m} (m - the half-width band of the matrix) or block-tridiagonal matrix A_N^{-1} ($N = n$ x m - full dimension of the block matrix; m - the dimension of the blocks) and their relationships with the covariance matrices of measurements with ordinary (simple) Markov Random Processes (MRP), multiconnected MRP and vector MRP respectively. Such covariance matrices are frequently occurring in the problems of optimal filtering, extrapolation and interpolation of MRP and Markov Random Fields (MRF). It is shown, that the structure of the matrix A_n^1, A_n^m, A_N^m, has the same form, but the matrix elements in the first case are scalar quantities; in the second case matrix elements representing a product of vectors of dimension m; and in the third case, the off-diagonal elements are the product of matrices and vectors of dimension m. The properties of such matrices were investigated and a simple formulas of their inversion was founded. Also computational efficiency in the storage and inverse of such matrices have been considered. To illustrate the acquired results an example of the covariance matrix inversions of two-dimensional MRP is given.

Expansions of solutions to ODE into transseries

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We consider a polynomial ODE of the order n in a neighbourhood of zero or of infinity of the independent variable. A method of calculation of its solutions in the form of power series was described in [1]. There in Section 7