IITP'S DIRECTIONS OF ACTIVITY AND RESULTS IN 2004

The directions of activity and results of 2004 (some abstracts and main publications) are presented according to the IITP's basic scientific structure (through laboratories).

LABORATORY 1

Laboratory of Information Transmission and Control Theory

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DIRECTIONS OF ACTIVITY:

- the development of the mathematical models, methods and algorithms for the protection of the information networks;
- the development methods of the algebra and information theory for the construction of the diagnostic built-in system;
- the study of limit behavior of solutions of non-autonomous non-linear evolution equations, investigations of trajectory;
- attractors of partial differential equations, their structure and dependence on parameters, constructions of integral manifolds with exponential tracing;
- source coding and data compression;
- the problem of asymptotically optimal universal coding to relative redundancy creation;
- nonparametric estimation: adaptive estimation in partial linear models, statistical approach to some inverse boundary problems for partial differential equations, applications of wavelets in nonparametric estimation;
- algorithmic information theory;
- codes with iterative decoding, code division multiple access (CDMA) systems;
- the development of asymptotic theory nonparametric statistic;
- analysis of systems with complex non-linearities (hysteresis, delays, round-off and discretization effects);

- asynchronous systems;
- hybrid systems;
- oscillation theory, Hopf bifurcations, stability;
- network optimization.

MAIN RESULTS

The binary extended nonlinear perfect codes of length 2^m, with rank n-m were considered. The codewords of weight 4 form Steiner systems S(n,4,3) with the same rank n-m. The method of construction of all such non-equivalent systems is presented. All such systems and codes for length n=16 are studied. In particular, the group of symmetries of such codes and systems are found. The Steiner systems S (16,4,3) with ranks 12 and 13 are classified.

The coset weight distribution of binary BCH codes of length 2^m (m odd) with minumal distance 8 is completely resolved. The exact expressions for the number of code words of weight four of cosets of weight four are obtained in terms of exponential sums of three distinct types, including Kloosterman sums. This approach gives some new results for Kloosterman sums and also for propagation characteristics of mapping x to x^{-1}.

Some important systems of evolution equations from mathematical physics were studied by means of the theory of trajectory attractors for which the classical theory of attractors is not applicable (for example, due to the lack of uniqueness of solutions). In particular, the trajectory attractors were constructed for non-autonomous Ginzburg-Landau equations and for the Leray-alpha model of the 3D Navier-Stokes system. The trajectory and global attractors were constructed and studied for dissipative equations with memory arrising in some problems of matereal science. The spatial structure of the global attractors for equations in unbounded domains was analyzed and spatio-temporal chaos was discovered in the structure of the global attractor of spatially homogeneous reaction-diffusion systems in R^n.

We investigated several nonlocal bifurcation problems, including bifurcations of forced oscillations, subharmonics (periodic solutions of multiple periods), and cycles. The main attention was devoted to oscillations of large amplitudes. A new method was developed to study bifurcations from infinity for systems with saturating nonlinearities and their vector analogues. This method allows one to analyze systems with unbounded branches of solutions, and may be applied to various boundary value problems. For problems on Andronov-Hopf bifurcations for autonomous systems an approach was presented to estimate lengths of branches of cycles arising from an equilibrium and from infinity. We obtained sufficient conditions for the branches of solutions to have a simple structure (to be a curve in functional spaces) and to be robust with respect to other bifurcations.

New results were obtained for subharmonic bifurcations (subfurcation) from infinity. Conditions for the existence of continuous branches of subharmonics of large periods and amplitudes were presented. The subfurcation appears when a pair of root of a characteristic polynomial crosses the imaginary axis at irrational points $\pm\alpha i$. Estimates for lengths of intervals of parameter values, for which large subharmonics exist, are given. In other words, these estimates bound the lengths and widths of synchronization beaks (Arnold tongues) in the problem of subharmonic bifurcation from infinity. Our theorems establish relationships between the rate of convergence of Diophantine approximations of α, the rate of saturation of the nonlinearity, and the

smoothness of the forcing term. The existence and localization of unbounded sequences of subharmonics were studied for non-resonant pendulum type equations.

Two types of singular problems were studied. First, the phenomenon of mode synchronization in delayed systems with fast and slow variables was investigated. Such systems were presented as models for high frequency semiconductor lasers in optical networks. New methods to estimate domains of mode synchronization in parameter spaces for impulse regimes were presented. These methods are based on various stability criteria and on derivation of new simplified models, where the boundaries of synchronization domains coincide with Neimark-Sacker bifurcation curves. Secondly, we considered singular problems in relation to the phenomenon of delayed loss of stability of multi-loop systems and estimated the delay of stability loss in terms of simple properties of the nonlinear terms, provided that the linear terms are time-independent.

Systems with hysteresis were studied, including bifurcations of forced and free oscillations; stability analysis; structures of bifurcated continua of oscillations for two different cases (where the amplitude of oscillation is less than the domain of the hysteresis phenomenon and where this amplitude is larger than the hysteresis domain). Particularly, Andronov-Hopf type bifurcations of large cycles were studied, subharmonic oscillations, bifurcations of quasi-periodic oscillations and tori. Applications to various models were investigated like the Duffing type oscillators with ferro-magnetic friction, the Van-der-Pole oscillator with Preisach hysteresis, system with the Ishlinckii-Prandtl hysteresis nonlinearity in the feedback. The results obtained are based on new analytic approaches and computer algorithms for bifurcation analysis. The dissipativity of pendulum type equation with ferromagnetic friction was proved for sufficiently wide hysteresis loop. In comparison to other types of energy dissipative bounded terms (like the Coulomn friction or the Ishlinskii-Prandl nonlinearity), the ferromagnetic friction, described by the Preisach model, is infinetesimally small. The analysis of globally and locally stable regimes in systems with the Armstrong-Frederic and Chaboche hysteresis nonlinearities (such nonlinearities have non-closed hysteresis loops) was completed.

Investigation of discontinuous order preserving circle maps was continued. In was shown that the principal properties of the Poincare's theory of the rotation number may be extended to discontinuous circle maps, provided that they possess a closed graph. Obtained results were used to analyze frequency properties of the so-called extremal trajectories of finite matrix sets. These trajectories are characterized by worst possible convergence rate (or best possible growth rate), and so the growth rate of such trajectories coincide with the generalized spectral radius of the matrix set under consideration. It is shown that for such trajectories the switching frequency, i.e. the frequency of applying specific matrix for calculating the sequential trajectory element, does not depend on a choice of a trajectory and, at the same time, depends continuously on the matrix set. Obtained results were used to present a new proof of counterexample to the known Lagarias-Wang Conjecture on Finiteness, fulfilled in the spirit of ideas of the classical theory of dynamical systems.

Averaging properties of vector hysteresis nonlinearities were studied, with emphasis made on (fluid) hysteresis models of queueing networks. The study of multidimentional play operator with the critical set depending on a variable parameter was continued. Operators of this kind arise in the models of elastic-palstic materials in periodically changing environment parameters such as temperature.

The joint work was concerned with so called mean field models of closed networks with one ore more classes of customers. For a single class, previous results were

considerably improved by means of a new "nonlinear shift" technique. This method made it possible to lift a lot of constraints in the Poisson hypothesis and to encompass the class of mutually dependent service times. In an open case, a smoothing theorem for finite Jackson-type networks was proved in the case of a time-dependent Poisson inflow of customers. The range of intensities of the outflow does not exceed that of the inflow.

The work on novel hierarchical hybrid optical cross-connects continued the first half of the year. The proposed approach is based on aggregation of individual wavelengths into wavebands that can then be routed in transparent optical domain. The key innovation is based on utilization of non-uniform wavebands for most efficient packing of wavelengths. Analysis of novel combined routing, waveband aggregation and wavelength assignment algorithms has been carried out. The results demonstrated significant cost savings that could be achieved in the area of optical cross-connects. The results of the research were published in several conference papers and as a chapter of a Springer book.

In the second half of the year, the focus was shifted on fixed wireless networks, where new architecture solutions improving the coverage and cost-efficiency of existing cellular systems were proposed and analyzed. The results of the research were published in several conference papers.

Necessary and sufficient conditions for the linear detectors to be asymptotically optimal are found.

Characteristics of a successive cancellation scheme in iterative decoding are investigated. Its comparison with the minimum mean-square error method has been done.

New inequalities for the mutual information and variational distance were obtained. Maximum Entropy Principle was studied for the case of algorithmic entropy and algorithmic free energy. Several concentration theorems were proved for this case. Asymptotic relations for frequencies of energy levels in the equilibrium states were obtained. The notions of predictive complexity and predictive information were studied.

The analytic expression for the bit error probability of memory 2, rate ½ convolutional codes is obtained. The result is used for analysis of turbo codes where this convolutional code is component code. The minimum distance of special class of LDPC codes with parity check matrices composed from permutation matrices has been studied, coded modulation scheme using LDPC codes is considered.

Values of separating parameter on a case of several first values of lengths of shortened Kerdock codes are found.

The partitioning of the space of binary vectors into classes of equivalence under action of transformations from some groups arising in the theory of codes and other combinatory objects are received.

Principles of formation of sets DNK, on their possible belonging to separating systems are produced.

The preliminary investigation of information picked up by the pairs of electromolecular angular acceleration sensors was carried out.Adequacy of quasistationary parametric models - two-dimensional autoregression time-series and linear system - were compared depending on mutual position and orientation of pairs of sensors with the goal of classification of certain types of contractions and estimation of fetal and pregnant women heart rate.

A modular package of corresponding MatLab procedures was developed.

The continued the study of universal coding of memoryless sources with “small difference” of probability distributions; the value of this difference is defined by the “cod-

ing divergence" function. Earlier it was found out that the estimation of unknown probability distributions, based on the deterministic restriction of the coding divergence, has some essential disadvantages. Therefore it was proposed the estimation method on the basis of weighting of joint probability of sequences at the outputs of all the sources, where the weighting coefficient is the function of the coding divergence. It was shown that the use of exponential function of the coding divergence let us remove all disadvantages of the deterministic approach. Nevertheless some problems continue to be open. First of all those are the inserting of multialphabet properties into the algorithm and the decreasing of the implementation complexity

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- **Russian Foundation of Basic Research (No. 03-01-00258):** "Methods to analyze processes in aggregated nonlinear control systems and data transmission systems with hysteresis and other nonsmooth nonlinearities and with weak organization of internal interaction".
- **Russian Foundation of Basic Research (No. 04-01-00330):** "Periodic oscillations in control systems".
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PUBLICATIONS IN 2004

Books

1. Zigangirov K.Sh. Theory of CDMA Communication. New York: John Wiley, 2004.

Articles

1. Бурнашев М.В. Об оптимальных детекторах в задачах обнаружения с многими пользователями // Проблемы передачи информации. 2004. Т. 40. № 1. С. 48-57.

2. Бурнашев М.В., Кржимен В.А., Ши З., Шлегель К.Б. Анализ динамики последовательного исключения интерференции в итеративном декодировании // Проблемы передачи информации. 2004. Т. 40. № 4. С. 3-25.
3. Вьюгин В.В., Маслов В.П. Принцип максимума энтропии и алгоритмическая случайность // ДАН. 2004. Т. 398. № 1. С. 19-22.
4. Зелик С.В. Многопараметрические полугруппы и аттракторы уравнений реакции-диффузии в R^n // Труды ММО. 2004. Т. 65. № 4. С. 69-130.
5. Зиновьев В.А., Зиновьев Д.В. Двоичные совершенные коды длины 15, построенные обобщенной каскадной конструкцией // Проблемы передачи информации. 2004. Т. 40. № 1. С. 27-39.
6. Зиновьев В.А., Зиновьев Д.В. Классификация систем четверок Штейнера порядка 16, ранг которых не превышает 13 // Проблемы передачи информации. 2004. Т. 40. № 4. С. 48-67.
7. Зиновьев В.А., Хеллесет Т. О весовых спектрах сдвигов кодов типа Геталса // Проблемы передачи информации. 2004. Т. 40. № 2. С. 19-36.
8. Зиновьев Д.В., Соле П. Четверичные коды и двухфазные последовательности, полученные из кодов над Z8 // Проблемы передачи информации. 2004. Т. 40. № 2. С. 50-62.
9. Козякин В.С., Кузнецов Н.А. Устойчивость линейных рассинхронизованных систем // Тезисы докладов VIII Международного семинара "Устойчивость и колебания нелинейных систем управления" (Москва, ИПУ РАН, 2-4 июня 2004). М: ИПУ РАН и ООО "Алтима стандарт", 2004. С. 89-90.
10. Красносельский А.М., Покровский А.В., Рачинский Д.И. О сравнении гарантированных оценок скорости сходимости одного класса итерационных процедур // Автоматика и телемеханика. 2004. № 10. С. 128-133.
11. Красносельский А.М., Рачинский Д.И. Ветвление на бесконечности решений уравнений с двукратным вырождением // Доклады РАН. 2004. Т. 394. № 4. С. 439-443.
12. Курышин С.А., Сагалович Ю.Л. Указание неисправной вершины бинарной сети модулей при условии случайного распространения ошибок // Автоматика и телемеханика. 2004. № 7. С. 106-113.
13. Штарьков Ю.М., Чокенс Ч.Дж., Виллемс Ф.М.Дж. Оптимальное универсальное кодирование по критерию максимальной индивидуальной относительной избыточности // Проблемы передач информации. 2004. Т. 40. № 1. С. 98-110.
14. Aulbach B., Elaydi S., Kozyakin V., Ladas G. A short introduction to asynchronous systems // Proceedings of the Sixth International Conference on Difference Equations Augsburg, Germany 2001: New Progress in Difference Equations. CRC Press. Boca Raton. 2004. P. 153-166.
15. Chepyzhov V.V., Ilyin A.A. On the fractal dimension of invariant sets; applications to Navier Stokes equations // Discrete and Continuous Dynamical Systems. 2004. V. 10. No. 1&2. P. 117-135.
16. Chepyzhov V.V., Vishik M.I., Wendland O. On non-autonomous sine-Gordon type equations with a simple global attractor and some averaging // Discrete and Continuous Dynamical Systems. 2005. V. 12. No. 1. P. 27-38.
17. Pokrovskii A., Rasskazov O., Vladimirov A. Averaging principle for differential equations with hysteresis // Preprints of BCRI, UCC, Ireland. 2004. 05/04.
18. Lentmaier M., Truhachev D.V., Zigangirov K.Sh. Analytic Expressions for the Bit Error Probability of Rate -1/2 Memory 2 Convolutional Encoders // IEEE Trans. on Information Theory. 2004. V. 50. No. 6.

19. Huebner A., Truhachev D.V., Zigangirov K.Sh. On Permutor Designs Based on Cycles for Serially Concatenated Convolutional Codes // IEEE Transactions on Communications. September 2004. V. COM-52. No. 9. P. 1494-1503.
20. Zinoviev D.V., Zinoviev V.A. Classification of Steiner quadruple systems of order 16 and rank at most thirteen // Proceedings Ninth International Workshop on Algebraic and Combinatorial Coding Theory. June 19-25, Kranevo, Bulgaria. 2004. P. 399-403.
21. Charpin P., Helleseth T., Zinoviev V.A. On binary BCH codes with minimal distance 8 and Kloosterman sums // Proceedings Ninth International Workshop on Algebraic and Combinatorial Coding Theory. June 19-25, Kranevo, Bulgaria. 2004. P. 90-94.
22. Zinoviev D.V., Flicker Y. Twisted Characters of a small Representation of PGL (4) // Moscow Mathematical Journal. 2004. V. 4. No. 2. P. 333-368.
23. Sole P., Zinoviev D. The Most Significant Bit of Maximum Length Sequences Over Z_{2^l}: Autocorrelation and Imbalance // IEEE Transactions on Information Theory. 2004. V. 50. P. 1844-1846.
24. Kozyakin V. A short introduction to asynchronous systems // Proceedings of the Sixth International Conference on Difference Equations (B. Aulbach, S. Elaydi, and G. Ladas, eds.). Augsburg, Germany 2001: New Progress in Difference Equations. CRC Press, Boca Raton. 2004. P. 153-166.
25. Kloeden P., Kozyakin V. Uniform nonautonomous attractors under discretization // Discrete and Continuous Dynamical Systems. 2004. V. 10. No. 1-2. P. 423-433.
26. Kloeden P., Kozyakin V. The inflation and perturbation of nonautonomous difference equations and their pullback attractors systems // Proceedings of the Sixth International Conference on Difference Equations. Augsburg, Germany 2001: New Progress in Difference Equations. CRC Press, Boca Raton. 2004. P. 139-152.
27. Krasnosel'skii A.M., McInerney J., Pokrovskii A.V. Sinchronized double frequency oscillations in a class of weakly resonant systems // Nonlinear Analysis. Theory, Methods & Applications. 2004. V. 57. No. 7-8. P. 929-949.
28. Krasnosel'skii A.M., Pokrovskii A.V. Large subharmonics of pendulum-like equations // The first 60 years of Nonlinear Analysis of Jean Mawhin. Eds. M. Delgado, J. Lopez-Gomez, R. Ortega, A. Suarez. World Scientific Publishing. 2004. P. 103-116.
29. Krasnosel'skii A.M., Pokrovskii A.V., Rachinskii D.I. On guaranteed estimates of convergence rate for one class of iteration procedures // Automation and Remote Control. 2004. V. 65. No. 10. P. 1635-1640.
30. Krasnosel'skii A.M., Rachinskii D.I. Branching at infinity of solutions to equations with degeneration of multiplicity two // Doklady Mathematics. 2004. V. 69. No. 1. P. 79-83.
31. Krasnosel'skii A.M., Rachinskii D.I. Remark on the Hopf bifurcation theorem // Mathematische Nachrichten. 2004. V. 272. P. 95-103.
32. Rachinskii D.I. On a bifurcation of stable large-amplitude cycles for equations with hysteresis // Automation and Remote Control. 2004. V. 65. No. 12. P. 1915-1937.
33. Ganguly S., Izmailov R., Chlamtac I. Hybrid Hierarchical Optical Network // In "Emerging Optical Network Technologies: Architectures, Protocols and Performance". Edited by K. Sivalingam and S. Subramaniam. Springer. 2004.
34. Maljutov M.B. Robust Modification of the EM-Algorithm for Parametric MultiTrajectory Estimation in Noise and Clutter // Data Fusion for Situation Monitoring, Incident Detection, Alert and Response Management. E. Shahbazian, G. Rogova, P. Valen (eds.). Kluwer Academic Publishers. 2005. P. 693-708.

35. Maljutov M.B. Non-Parametric Multi-Trajectory Estimation // Data Fusion for Situation Monitoring, Incident Detection, Alert and Response Management, E. Shahbazian, G. Rogova, P. Valen (eds.). Kluwer Academic Publishers. 2005. P. 709-721.
36. Maljutov M.B. Fusion Of Various Methods For Resolving The Shakespeare Controversy // Data Fusion for Situation Monitoring, Incident Detection, Alert and Response Management. E. Shahbazian, G. Rogova, P. Valen (eds.). Kluwer AcademicPublishers. 2005. P. 807-822.
37. Deheuvels P., Martinov G. Karhunen-Loeve Expansions for weighted Wiener processes and Brownian Bridges via Bessel Functions, Progress in Probability // Birkhauser Verlag, Basel/Switzerland. 2003. V. 55. P. 57-93.
38. Martinov G. Weighted Cramer-von Mises test with estimated parameters // В сб. "Longevity, Aging and Degradation Models". Труды международной конференции LAD'2004. Санкт-Петербургский Политехнический Университет. 2004. V 2. P. 207-222.
39. Khasminskii R., Milstein G. Stability of gyroscopic systems under small random excitations // Stochastics and Dynamics. 2004. V. 4. No. 1. P. 107-134.
40. Khasminskii R., Yin G. On Averaging Principles: An Asymptotic Expansion Approach // SIAM Journal on Math. Analysis. 2004. V. 35. No. 6. P. 1534-1560.
41. Khasminskii R. On-line nonparametric estimation // Statistics & Operation Res. Transactions. 2004. V. 28. P. 1-8.

In print

1. Бассалыго Л.А., Зиновьев В.А. О многочленах над конечными полями нечетной характеристики с максимальным значением модуля тригонометрической суммы // Математические заметки.
2. Вишик М.И., Тити Е.С., Чепыжов В.В. Аппроксимация траекторного аттрактора 3D системы Навье-Стокса альфа-моделью Лерэ // Доклады Академии наук. 2005. Т. 400. № 5.
3. Вишик М.И., Чепыжов В.В. Неавтономное уравнение Гинзбурга-Ландау и его аттракторы // Математический сборник.
4. Вишик М.И., Чепыжов В.В. Траекторный аттрактор неавтономного уравнения Гинзбурга-Ландау // Доклады Академии наук.
5. Вьюгин В.В., Маслов В.П. Теоремы о концентрации для энтропии и свободной энергии // Проблемы передачи информации.
6. Горицкий А.Ю., Чепыжов В.В. Свойство дихотомии решений квазилинейных уравнений в задачах об инерциальных многообразиях // Математический сборник.
7. Зигангиров К.Ш., Костелло Д., Лентмайер М., Трухачёв Д.В., Шридхаран А. О минимальном расстоянии низкоплотностных кодов с проверочными матрицами, составленными из перестановочных матриц // Проблемы передачи информации. 2005. Т. 41. № 1.
8. Зиновьев В.А., Зиновьев Д.В. О кодах Васильева длины n = 2^m и системах Штейнера S(16,4,3) ранга n-m над F_2 // Проблемы передачи информации.
9. Козякин В.С. Доказательство контрпримера к гипотезе Лагариаса-Ванга в духе теории динамических систем // 50 стр. (Статья подготовлена к печати).
10. Пинскер М.С. Об оценке информации через вариацию // Проблемы передачи информации.
11. Brokate M., Pokrovskii A.V., Rachinskii D.I., Rasskazov O. Differential equations with hysteresis in examples // In: The Science of Hysteresis. Eds. Isaak Mayergoyz, Giorgio Bertotti. Elsvier Science. 150 pp.

12. Brokate M., Rachinskii D.I. On global stability of the scalar Chaboche models // Nonlinear Analysis: Real World Applications. 2005. V. 6. P. 67-82.
13. Brokate M., Rachinskii D.I. Global stability of Armstrong – Frederick models with periodic uniaxial inputs // Nonlinear Differential Equations and Applications.
14. Brokate M., Pokrovskii A.V., Rachinskii D.I. Asymptotic stability of continual sets of periodic solutions to systems with hysteresis // Preprint of the Weierstrass Institute for Applied Analysis and Stochastics. Berlin. 2004. V. 902. P. 1-22: submitted to J. Mathematical Analysis and Applications.
15. Burnashev M., Schlegel Ch., Shi Z. Asymptotically optimal power allocation and code selection for iterative joint detection of coded random CDMA // IEEE Trans. on Inform. Theory.
16. Charpin P., Helleseth T., Zinoviev V.A. Propagation characteristics of x^{-1} // Finite Fields and Applications.
17. Charpin P., Helleseth T., Zinoviev V.A. On binary BCH codes with minimal distance 8 and Kloosterman sums // Designs, Codes and Cryptography.
18. Chepyzhov V.V., Miranville A. Trajectory and global attractors of dissipative hyperbolic equations with memory // Communications on Pure and Applied Ananysis.
19. Chepyzhov V.V., Miranville A. On trajectory and global attractors for semilinear heat equations with fading memory // Indiana University Mathematical Journal.
20. Khasminskii R., Yin G. Limit Behavior of Two-time-scale Diffusions Revisited // Journal of Differential Equations.
21. Khasminskii R., Yin G. Uniform Asymptotic Expansions for Pricing European Options // SIAM Journal on Math. Analysis.
22. Kozyakin V.S. Proof of a Counterexample to Lagarias-Wang Conjecture in the Spirit of the Theory of Dynamical Systems. 50 pp.: prepared for publication.
23. Kozyakin V.S., Krasnosel'skii A.M., Rachinskii D.I. Subharmonic bifurcation from infinity // Journal of Differential Equations.
24. Krasnosel'skii A.M., Pokrovskii A.V. Dissipativity of a nonresonance pendulum with ferromagnetic friction // Automation and Remote Control.
25. Krasnosel'skii A.M., Pokrovskii A.V. Subharmonics of large amplitudes and periods // Differential Equations.
26. Krasnosel'skii A.M., Rachinskii D.I. On a number ofunbounded solution branches near the asymptotic bifurcation // Functional Analysis and its Applications.
27. Lentmaier M., Pittermann J., Zigangirov K.Sh. On Coded Modulation Using LDPC Convolutional Codes // Archiv fuer Elektronik und Uebertragungstechnik.
28. Maljutov M.B. Authorship attribution of texts: a review // Proceedings of the program "Information transfer" held in ZIF. University of Bielefeld, Germany. 2002-2004. 17 pages.
29. Maljutov M.B., Maljutov D.M. Modeling sequential discrimination between close Markov chains // Proceedings of the program "Information transfer" held in ZIF. University of Bielefeld, Germany. 2002-2004. 8 pages.
30. Maljutov M.B. Review of methods and examples of attributing authorship of texts // Review of Applied and Industrial Mathematics. 45 pages.
31. Maljutov M.B. Maximin Designs for testing degree of a multivariate polynomial // Mathematical Methods of Statistics.
32. Martynov G.V., Mesbah M. Goodness of fit test and latent distribution estimation in the mixed Rasch model // Communications in Statistics.
33. Martynov G.V., Deheuvels P. A Karhunen-Loeve decomposition of a Gaussian process generated by independent pairs of exponential random variables // Annals of Statistics.

34. Rachinskii D.I., Schneider K.R. Dynamic Hopf bifurcations generated by nonlinear terms // J. Differential Equations.
35. Rachinskii D.I., Vladimirov A. Q-switching instability in a mode locked semiconductor laser // Preprint of the Weierstrass Institute for Applied Analysis and Stochastics. Berlin. 2004. V. 975. P. 1-13: submitted to Optics Letters.
36. V'yugin M., V'yugin V. Predictive complexity and information // Journal of Computer and System Sciences.

Abstracts

1. Bhatnagar S., Ganguly S., Izmailov R., Qiao C. Multi-Path Adaptive Optical Burst Forwarding // Proceedings of IEEE HPSR 2004.
2. Charpin P., Helleseth T., Zinoviev V.A. On binary BCH codes with minimal distance 8 and Kloosterman sums // Proceedings Ninth Internatinal Workshop on Algebraic and Combinatorial Coding Theory. June 19–25, Kranevo, Bulgaria, 2004. P. 90-94.
3. Chatterjee M., Ganguly S., Izmailov R., Tu N. Non-real Time Content Scheduling in Wireless Data Networks // Proceedings of PIMRC 2004.
4. Costello D.J., Jr., Huebner A., Nuecker T., Zigangirov K.Sh. On Joint Permutor Design and Unequal Error Protection for Multiple Turbo Codes // Proc. 5th ITG Conference on Source and Channel Coding. Erlangen, Germany, January 2004.
5. Costello D.J., Jr., Lentmaier M., Truhachev D.V., Jr., Zigangirov K.Sh. On the Block Error Probability of Iteratively Decoded LDPC Codes // Proc. 5th ITG Conference on Source and Channel Coding. Erlangen, Germany, January 2004.
6. Costello D.J., Jr., Lentmaier M., Sridharan A., Truhachev D.V., Zigangirov K.Sh. On the Free Distance of LDPC Convolutional Codes // Proceedings ISIT-2004. Chicago, USA, June 2004.
7. Costello D.J., Jr., Lentmaier M., Truhachev D.V., Zigangirov K.Sh. Turbo Codes and Shannon's Condition for Reliable Communications // Proceedings ISIT-2004. Chicago, USA, June 2004.
8. Costello D.J., Jr., Lentmaier M., Pusane A.E., Zigangirov K.Sh. Reduced Complexity Decoding Strategies for LDPC Convolutional Codes // Proceedings ISIT-2004. Chicago, USA, June 2004.
9. Costello D.J., Jr., Lentmaier M., Sridharan A., Zigangirov K.Sh. Convergence Analysis for a Class of LDPC Convolutional Codes on the Erasure Channel // Proceedings of the 42nd Annual Alerton Conference on Communication, Control, and Computing. October 2004, Monticello, IL, USA.
10. Costello D.J., Jr., Fuja T.E., Lentmaier M., Pusane A.E., Zigangirov K.Sh. Multilevel Coding/Modulation Using LDPC Convolutional Codes // In Proc. International Symposium on Information Theory and its Applications (ISITA 2004). October 10-13, 2004. Parma, Italy. P. 685-689.
11. Dodunekov S., Helleseth T., Zinoviev V.A. On q-ary Grey-Rankin bound and codes meeting this bound // IEEE Symposium on Information Theory. USA, Chicago, August, 2004.
12. Ganguly S., Izmailov R., Wei H. Channel-Aware Soft Bandwidth Guarantee Scheduling for Wireless Packet Access // Proceedings of WCNC 2004.
13. Ganguly S., Izmailov R., Varsou A. Waveband Routing on Logical Topologies Constructed Over a Ring Network // Proceedings of IEEE HPSR 2004.
14. Ganguly S., Izmailov R., Wei H. AdhoCell: Adhoc Overlay for Cellular Capacity Filling // Proceedings of MOBIHOC 2004.
15. Ganguly S., Izmailov R., Mouftah H., Tu N. Waveband Routing and Merging in Hybrid Optical Networks // Proceedings of IEEE ICC 2004.

16. Ganguly S., Izmailov R., Wei H. Adhoc Relay Network Planning for Improving Cellular Data Coverage // Proceedings of PIMRC 2004.
17. Ganguly S., Izmailov R., Wei H. Routing and Scheduling for Adhoc Cell Downlink Data Capacity Enhancement // Proceedings of VTC 2004.
18. Maslov V., V'yugin V. Maximum Entropy Principle in Non-Oredered Setting // Algorithmic Learning Theory: 15th International Conference, ALT 2004. Padova, Italy, October 2-5, 2004. Proceedings Lecture Notes in Computer Science Springer. Proceedings. 2004. V. 3244. P. 221-233.
19. Sagalovich Y.L. Partitioning of the vector space into orbits by the action of automorphism group of some codes // Proceedings Ninth Internatinal Workshop on Algebraic and Combinatorial Coding Theory. June 19-25, Kranevo, Bulgaria, 2004. P. 351-354.
20. Sol'e P., Zinoviev D. Distribution of r-Pattern in the Most Significant Bit of a Maximum Length Sequence over $\ZZ_{2^l}$ // SETA04. Symposium on Information Theory. Korea, Seoul, October, 2004.
21. Sol'e P., Zinoviev D. Weighted degree trace codes for PAPR reduction // SETA04. Symposium on Information Theory. Korea, Seoul, October, 2004.
22. Zinoviev D.V., Zinoviev V.A., Classification of Steiner quadruple systems of order 16 and rank at most thirteen // Proceedings Ninth Internatinal Workshop on Algebraic and Combinatorial Coding Theory. June 19-25, Kranevo, Bulgaria, 2004. P. 399-403.