



BRÅKET



Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 4

FREDAGEN DEN 1 FEBRUARI 2008

BRÅKET

Veckobladet från
Institutionen för matematik
vid Kungl Tekniska Högskolan
och Matematiska institutionen
vid Stockholms universitet

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Sista manustid för nästa nummer:
Torsdagen den 7 februari kl. 13.00.

Disputation i matematik

Joakim Arnlind disputerar på avhandlingen *Graph Techniques for Matrix Equations and Eigenvalue Dynamics* fredagen den 8 februari kl. 14.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 3 sidan 5.

Kurs

Rikard Bøgvad: Hyperplane arrangements and splines. Se sidan 3.

SEMINARIER

Fr 02–01 kl. 10.15. Seminar in Theoretical and Applied Mechanics. Claes Hedberg, Blekinge Tekniska Högskola: *Self-silenced sound and non-linear acoustic non-destructive testing*. Sal E53, KTH, Osquars Backe 14, 2 tr. Se Bråket nr 3 sidan 6.

Fr 02–01 kl. 13.15–14.15. Graduate Student Seminar. Michael Björklund, Matematik, KTH: *Choquet-Deny theorems and beyond*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 3 sidan 3.

Må 02–04 kl. 13.15–14.00. Docentföreläsning i matematik. Hans Ringström: *The Einstein-Vlasov system*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 2 sidan 11.

Må 02–04 kl. 15.15–16.00. Seminarium i finansiell matematik. Karl Hallberg presenterar sitt examensarbete: *Valuing Forward Start CDOs and options on CDOs using the Hull-White model*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Må 02–04 kl. 16.15–17.00. Seminarium i finansiell matematik. Hanna Sahle presenterar sitt examensarbete: *Pricing of Up-and-Out Options under Stochastic Volatility*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Ti 02–05 kl. 14.00–15.00. Mittag-Leffler Seminar — Plurikomplexa seminariet. Azim Sadullaev, National University of Uzbekistan: *On analytic multifunctions*. Institut Mittag-Leffler, Auravägen 17, Djursholm.

Fortsättning på nästa sida.

Money, jobs: Se sidorna 8–9.

Seminarier (fortsättning)

- Ti 02–05 kl. 15.30–16.30. Mittag-Leffler Seminar — Plurikomplexa seminariet.**
Bo Berndtsson, Chalmers tekniska högskola, Göteborg: *Complex Brunn-Minkowski inequalities*. Institut Mittag-Leffler, Auravägen 17, Djursholm.
- On 02–06 kl. 10.00–11.00. Presentation av examensarbete i matematik** (15 högskolepoäng, fördjupningsnivå). **Madeleine Leander**: *Helly's Type Theorems*. Handledare: **Paul Vaderlind**. Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 5.
- On 02–06 kl. 11.00–12.00. Common SU KoF/KTH Theoretical Physics Seminar.**
Stefan Theisen, Potsdam: *Hologravity: Classical Gravity vs. Quantum Field Theory*. Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 6.
- On 02–06 kl. 13.15–15.00. Algebra and Geometry Seminar. (Observera tiden!)**
Tobias Ekholm, Uppsala universitet: *Rational Symplectic Field Theory for exact Lagrangian submanifolds*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.
- On 02–06 kl. 13.45–14.45. Seminarium i analys och dynamiska system. (Observera tiden!)**
Bergfinn Durhuus, Köpenhamn: *The spectral dimension of random trees*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 3 sidan 6.
- On 02–06 kl. 14.30–15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar.**
Ardeshtir Hanifi, FOI: *Research in Computational Fluid Dynamics at FOI*. PDC:s seminarierum, KTH, Teknikringen 14, plan 3.
- To 02–07 kl. 14.00–15.00. Mittag-Leffler Seminar. Franc Forstneric**, University of Ljubljana: *Bordered Riemann surface in $\mathbb{C}^2$* . Institut Mittag-Leffler, Auravägen 17, Djursholm.
- To 02–07 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics. Professor Kristian Lindgren**, Göteborgs universitet: *Self-replicating patterns and information dynamics*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.
- To 02–07 kl. 15.30–16.30. Mittag-Leffler Seminar. Sergey Pinchuk**, Indiana University, Bloomington: *Introduction to reflection principle in higher dimensions*. (This is the third in a series of three lectures.) Institut Mittag-Leffler, Auravägen 17, Djursholm.
- Må 02–11 kl. 15.15–16.00. Seminarium i finansiell matematik. Kathryn M. Kaminski**, MIT Operations Research Center: *When do stop-loss rules stop losses?* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.
- On 02–13 kl. 13.15. Algebra and Geometry Seminar. Jan Slovak**: *Title to be announced*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
- On 02–13 kl. 15.00. Seminarium i matematisk statistik. Serik Sagitov**, Chalmers tekniska högskola, Göteborg: *A Galton-Watson model for evolutionary path to escape*. Rum 306 (Cramér-rummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 02–13 kl. 18.00–19.00. Offentlig föreläsning på Kungl. Vetenskapsakademien. Jasper Kirkby, CERN: *Cosmic rays and climate*. Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm. Se sidan 6.

To 02–14 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics. Professor Gerald Gabrielse, Harvard University: *One-electron quantum cyclotron: A new value for the electron magnetic moment and the fine structure constant*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 7.

Fr 02–15 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Erik Wernholt, Linköpings universitet: *Some aspects of system identification in robotics*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fr 02–15 kl. 13.15–14.15. Graduate Student Seminar. Douglas Lundholm, Matematik, KTH: *Refined algebraic quantization*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GRADUATE COURSE IN MATHEMATICS

Rikard Bøgvad:

Hyperplane arrangements and splines

This course is centred around two classical problems — how to calculate the volume of a polytope and count the number of lattice points in it.

Consider the positive “hyperoktant” $\mathbf{R}_+^N$ in $\mathbf{R}^N$ (all coordinates positive).

Assume that $\Pi : \mathbf{R}^N \rightarrow \mathbf{R}^n$ is a linear transformation, and for $y \in \mathbf{R}^n$, let $T(y)$ denote the volume of the intersection $P(y) := \mathbf{R}_+^N \cap \Pi^{-1}(y)$. The intersection is a “variable” polytope in $\mathbf{R}^N$, and an arbitrary convex polytope can be described in this way.

$T(y)$ is a fundamental example of a piecewise polynomial function, a k a spline, used in numerical analysis. The first problem is to describe this function in terms of the geometry of the polytope, and the second problem mentioned above to describe the discrete analogous function counting the number of lattice points.

This is recent work by among others Michele Vergne, and we will loosely follow a book by de Concini and Procesi, which can be found through the website of the course (<http://kurser.math.su.se>).

The attraction of the course book is, besides the intrinsic interest of the problems, that these are solved using a lot of classical machinery, such as tempered distributions, Fourier transforms, rings of differential operators, partial fractions decomposition, residues, polytopes, hyperplane arrangements, box-splines, . . . , but in a simple and accessible way, so that knowledge of these are not prerequisite. Instead one can hopefully just calmly enjoy seeing the concepts in concerted action

Tid och plats: Torsdagar kl. 10.15–12.00 från och med den 7 februari i rum 306 (Cramér-rummet), hus 6, Matematiska institutionen, SU, Kräftriket.

Welcome!

Rikard Bøgvad

SEMINARIUM I FINANSIELL MATEMATIK

Karl Hallberg

presenterar sitt examensarbete:

Valuing Forward Start CDOs and options on CDOs using the Hull-White model

Abstract: We present the Hull and White dynamical model for the number of defaults in a homogeneous pool of names. The model is an intensity based characterization of risk, where risk is either firm specific or market specific. We calibrate the model to market data, the iTRAXX Europe, and identify the characteristics of the model, and note its shortcomings in equity tranche pricing. Furthermore, we show how the model can be used to price Forward Start CDOs and options on Forward Start CDOs. The prices of options on Forward Start CDOs are also compared to an analytical formula for such claims.

Tid och plats: Måndagen den 4 februari kl. 15.15 – 16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK

Hanna Sahle

presenterar sitt examensarbete:

Pricing of Up-and-Out Options under Stochastic Volatility

Abstract: The purpose of this Master's Degree project is to price up-and-out call options under Heston's stochastic volatility model, with and without jumps. An analytical pricing formula under these models is calibrated to market vanilla prices in order to determine unknown model parameters. The resulting parameters are then tested for stability. The non-convex and nonlinear calibration problem is done mostly in Matlab but is also tested in Tomlab. Tomlab is an optimization platform for solving applied optimization problems in Matlab.

Tid och plats: Måndagen den 4 februari kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I MATEMATISK STATISTIK

Serik Sagitov:

A Galton-Watson model for evolutionary path to escape

Abstract: A multitype Galton-Watson process describes populations of particles that live one season and are then replaced by a random number of children of possibly different types. A biological interpretation of the event that the daughter's type differs from the mother's type is that a mutation has occurred. We study a situation when mutations are rare and, among the types connected in a network, there is a supercritical type allowing the system to escape from extinction. We establish a neat asymptotic structure for the Galton-Watson process escaping extinction due to a sequence of mutations towards the supercritical type. The conditional limit process is a GW process with a multitype immigration stopped after a sequence of geometric times.

Tid och plats: Onsdagen den 13 februari kl. 15.00 i rum 306 (Cramérnummet), hus 6, Matematiska institutionen, SU, Kräftriket.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Madeleine Leander: Helly's Type Theorems

Handledare: Paul Vaderlind.

Sammanfattning: Uppsatsens huvudsats, Hellys sats, säger att om en familj konvexa mängder i $\mathbb{R}^n$ är sådan att varje delfamilj innehållande $n + 1$ mängder har icke-tomt snitt, gäller detsamma för hela familjen. Hellys sats var en startpunkt för en snabb utveckling av kombinatorisk geometri. Nya generaliseringar och tillämpningar utvecklas årligen, några av dem presenteras i uppsatsen.

Tid och plats: Onsdagen den 6 februari kl. 10.00 – 11.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

OPTIMIZATION AND SYSTEMS THEORY SEMINAR

Erik Wernholt:

Some aspects of system identification in robotics

Abstract: Industrial robots are today essential components in the manufacturing industry, where they are used to save costs, increase productivity and quality, and eliminate dangerous and laborious work. High demands on accuracy and speed of the robot motion require that the mathematical models, used in the motion control system, are accurate. The models are used to describe the complicated nonlinear relation between the robot motion and the motors that cause the motion. Accurate dynamic robot models are needed in many areas, such as mechanical design, performance simulation, control, diagnosis, and supervision.

A trend in industrial robots is toward lightweight robot structures, where the weight is reduced but with a preserved payload capacity. This is motivated by cost reduction as well as safety issues, but results in a weaker (more compliant) mechanical structure with enhanced elastic effects. For high performance, it is therefore necessary to have models describing these elastic effects.

In this talk, we will deal with identification of dynamic robot models, which means that measurements from the robot motion are used to estimate unknown parameters in the models. The measured signals are angular position and torque of the motors. Identifying robot models is a challenging task, since an industrial robot is a multivariable, nonlinear, unstable, and resonant system. The unknown parameters (typically spring-damper pairs) in a physically parameterized nonlinear dynamic model are identified, mainly in the frequency domain, using estimates of the nonparametric frequency response function (FRF) in different robot configurations/positions. Each nonparametric FRF then describes the local behaviour around an operating point. The nonlinear parametric robot model is linearized in the same operating points, and the optimal parameters are obtained by minimizing the discrepancy between the nonparametric FRFs and the parametric FRFs (the FRFs of the linearized parametric robot model).

The talk will cover the selection of optimal robot configurations/positions, some methods for estimation of the multivariable nonparametric FRF, and a comparison of different parameter estimators. The usefulness of the proposed identification procedure is illustrated by experiments, where the identified nonlinear robot model gives a good global description of the dynamics in the frequency range of interest.

Tid och plats: Fredagen den 15 februari kl. 11.00 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

COMMON SU KOF/KTH THEORETICAL PHYSICS SEMINAR

Stefan Theisen:

Hologravity: Classical Gravity vs. Quantum Field Theory

Abstract: I will discuss how, within the AdS/CFT correspondence, the information of the CFT is encoded on the gravity side of the duality. As an application I present a very general discussion of the gravity side of anomalies in the CFT.

Tid och plats: Onsdagen den 6 februari kl. 11.00–12.00 i sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

ALGEBRA AND GEOMETRY SEMINAR

Tobias Ekholm:

Rational Symplectic Field Theory for exact Lagrangian submanifolds

Abstract: Symplectic Field Theory (SFT) was introduced by Eliashberg, Givental, and Hofer around 2000. It is a general framework for associating algebraic invariants by counting pseudo-holomorphic curves to contact and symplectic manifolds and their submanifolds. Until recently only the simplest version of SFT could be defined in the relative case of contact (symplectic) manifolds with a Legendrian (Lagrangian) submanifold. By now there are two approaches to more general versions of SFT: one using the string topology of the boundary values of the holomorphic curves and one restricting the topology of the curves. During the talk we give a brief introduction to SFT, describe the two approaches to relative SFT just mentioned, and discuss a conjectural relation between them.

Tid och plats: Onsdagen den 6 februari kl. 13.15–15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

OFFENTLIG FÖRELÄSNING PÅ KUNGL. VETENSKAPSAKADEMIEN

Jasper Kirkby: Cosmic rays and climate

Abstract: Among the most puzzling questions in climate change is that of solar – climate variability, which has attracted the attention of scientists for more than two centuries. For most of this time, even the existence of solar – climate variability has been controversial. However, recent palaeoclimatic data provide clear evidence for solar or cosmic ray forcing of the climate. Although the underlying mechanism remains a mystery, satellite data suggest that clouds may be influenced by galactic cosmic rays, which are modulated by the solar wind and, on longer time scales, by the geomagnetic field and the galactic environment of Earth. This talk presents an overview of the palaeoclimatic evidence for solar/cosmic ray forcing of Earth's climate and reviews the possible physical mechanisms, which will be investigated by the CLOUD experiment at CERN.

Tid och plats: Onsdagen den 13 februari kl. 18.00–19.00 i Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm.

SEMINARIUM I FINANSIELL MATEMATIK

Kathryn M. Kaminski:

When do stop-loss rules stop losses?

Abstract: Stop-loss rules — predetermined policies that reduce a portfolio’s exposure after reaching a certain threshold of cumulative losses — are commonly used by retail and institutional investors to manage the risks of their investments, but have also been viewed with some skepticism by critics who question their efficacy. In this seminar, we develop a simple framework for measuring the impact of stop-loss rules on the expected return and volatility of an arbitrary portfolio strategy, and derive conditions under which stop-loss rules add or subtract value to that portfolio strategy. We show that under the Random Walk Hypothesis, simple 0/1 stop-loss rules always decrease a strategy’s expected return, but in the presence of momentum, stop-loss rules can add value. To illustrate the practical relevance of our framework, we provide an empirical analysis of a stop-loss policy applied to a buy-and-hold strategy in U.S. equities, where the stop-loss asset is U.S. long-term government bonds. Using monthly returns data from January 1950 to December 2004, we find that certain stop-loss rules add 50 to 100 basis points per month to the buy-and-hold portfolio during stop-out periods. By computing performance measures for several price processes, including a new regime-switching model that implies periodic “flights-to-quality”, we provide a possible explanation for our empirical results and connections to the behavioural finance literature.

The talk is based on joint work with Andrew W. Lo.

Tid och plats: Måndagen den 11 februari kl. 15.15–16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Gerald Gabrielse:

One-electron quantum cyclotron:

A new value for the electron magnetic moment and the fine structure constant

Abstract: Not since 1987 has the electron magnetic moment and the fine structure constant been measured more accurately. Now, a one-electron quantum cyclotron has made possible much more accurate measurements of both. The dimensionless electron magnetic moment (often called the electron g value) is measured 15 times more accurately than in a celebrated measurement that stood for 20 years. The fine structure constant is measured 20 times more accurately than in any independent measurement. A quantum non-demolition measurement reveals the quantum structure in the cyclotron motion of an electron suspended by itself for months at a time. Cavity-inhibited spontaneous emission and a one-particle self-excited oscillator (SEO) give the resolution needed to carry out quantum-jump spectroscopy of the lowest energy levels of the weakly-bound electron-apparatus system. The SEO is the classical measurement system for the quantum states of the electron cyclotron motion and spin.

Tid och plats: Torsdagen den 14 februari kl. 15.15–16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

MONEY, JOBS

Columnist: Johannes Lundqvist, Department of Mathematics, Stockholm University.
E-mail: johannes@math.su.se.

Info = information. This will be given and repeated until obsolete. Rely on other sources as well.

BBKTH = Bulletin Board at the Department of Mathematics, KTH.

BBSU = Bulletin Board at the Department of Mathematics, SU.

The following information, with links, is also available at <http://www.math.su.se/~johannes/mj.html.en>.

Unless stated otherwise, a given date is the last date (e.g. for applications), and the year is 2008. A number without an explanation is a telephone number.

Standard information channels

1. A channel to information from Vetenskapsrådet: <http://www.vr.se/naturteknik/index.asp>.
2. A channel to information from the European Mathematical Society: <http://www.emis.de>.
3. A channel to information from the American Mathematical Society: <http://www.ams.org>.
4. KTH site for information on funds: <http://www.kth.se/aktuellt/stipendier>.
5. Stockholm University site for information on funds: <http://www2.su.se/forskning/stipendier/databas.php3>.
6. Umeå site for information on funds: http://www.umu.se/umu/aktuellt/stipendier_fond_anslag.html.
7. Job announcement site: <http://www.maths.lth.se/nordic/Euro-Math-Job.html>. This is run by the European Mathematical Society.
8. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) site for information on funds: <http://www.stint.se>.
9. Nordisk Forskerutdanningsakademi (NorFA) site for information on funds: <http://www.norfa.no>.
10. Svenska institutet (SI) site for information on funds: <http://www.si.se>.

New information

Jobs to apply for

11. Lunds universitet söker en eller två universitetslektorer i matematik. Sista ansökningsdag är den 25 februari. Web-info: http://www.naturvetenskap.lu.se/upload/LUPDF/natvet/Utlysninger/080225_390E.pdf.
12. Umeå universitet söker en "postdoctoral fellow" med doktorsexamen i matematisk statistik eller statistik. Innehavaren av tjänsten skall bedriva forskning med anknytning till "statistical modelling of sediment records to study environment and climate change". Tjänsten varar i ett år med möjlighet till förlängning med ytterligare ett år. Sista ansökningsdag är den 17 mars. Web-info: <http://www.math.umu.se/Aktuellt/Vacancies/postdocfellow31515508.pdf>.

Old information

Money to apply for

13. Stiftelsen Anna-Greta och Holger Crafoords fond utlyser bidrag och anslag inom ämnet "Matematik inspirerad av modern teoretisk fysik med anknytning till 2008 års Crafoordpristagares forskning" (se Bråket nr 2 sidan 9). Bidrag och anslag kan beviljas såväl till enskilda som institutioner. Bidrag och anslag delas ut företrädesvis till unga forskare. Disponibelt belopp för utdelning under våren 2008 är totalt 210 000 kr. Sista ansökningsdag är den 1 mars. Web-info: http://www.kva.se/KVA_Root/swe/awards/scholarships/detail_scholarships.asp?grantsId=11.
14. C. F. Liljevalch J:ors resestipendier utlyser resestipendier för företrädesvis forskarstuderande som inte har fyllt 35 år och som har studerat vid Stockholms universitet under två terminer före innevarande termin. Aktivt deltagande krävs om medel för konferens sökes. Sista ansökningsdag är den 15 februari. Web-info: <http://www2.su.se/forskning/stipendier/preview.php3?id=612>.

(Continued on the next page.)

15. Vetenskapsrådet utlyser ett bidrag för anställning som forskare i finansiell matematik. Anställningen är avsedd att vara ett steg i karriären för en självständig, etablerad forskare på docentnivå som är i en aktiv forskningsfas. På ansökan krävs underskrift av behörig företrädare för värdhögskolan/motsvarande (vanligtvis prefekten vid den institution där forskningen skall bedrivas). Sista ansökningsdag är den 20 februari 2008. Web-info: <http://www.vr.se/huvudmeny/sokabidrag/vetenskapsradetsutlysningar/utlysningvy.4.aad30e310abcb9735780004381.html?resourceId=-1378&languageId=1>.

Jobs to apply for

16. Mittuniversitetet söker en universitetslektor i matematikdidaktik till Institutionen för teknik, fysik och matematik, Campus Härnösand. Arbetsuppgifterna omfattar undervisning och handledning inom såväl forskarutbildning som grundläggande utbildning samt egen forskning. Sista ansökningsdag är den 3 mars. Web-info: http://www.miun.se/mhtemplates/MHPage_____35560.aspx.
 17. Reykjavíks universitet utlyser två postdoktorala tjänster i kombinatorik med start under hösten 2008. Tjänsten varar i två år med möjlighet till förlängning med ytterligare ett år. Sista ansökningsdag är den 20 februari. Web-info: <http://math.ru.is/ads/postdocs2008.html>.
 18. Umeå universitet söker en forskarassistent i tillämpad matematik. Tjänsten är tidsbegränsad till 2 år men kan förlängas med ytterligare 2 år. Forskarassistenter uppmuntras att delta i undervisning med 20 % och i sådant fall förlängs tiden till totalt 5 år. Sista ansökningsdag är den 15 februari. Web-info: http://www.umu.se/umu/aktuellt/arkiv/lediga_tjanster/312-5110-12-07.html.
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