

**Dang Luong Ky**

**Dinh Si Tiep**

### **Gradient horizontal de fonctions polynomiales**

Le gradient horizontal est la projection du gradient sur une distribution par rapport à une métrique donnée. On étudie les trajectoires de ce champ de vecteur dans le cas de distributions de codimension 1 et que toutes les données sont polynomiales.

**Do Anh Tuan**

### **p-adic admissible measures attached to Siegel modular forms**

We will construct some p-adic admissible measures attached to Siegel modular forms in the case of non-ordinary and arbitrary genus  $m$ .

**Duong Anh Tuan**

### **Propriétés spectrales de l'opérateur de Schrodinger avec champ magnétique fort**

Dans cet exposé, nous nous proposons d'étudier le spectre discret de l'opérateur de Schrödinger en dimension deux  $P_1(b, \omega) = (D_x - by)^2 + D_y^2 + \omega^2 x^2 - \sqrt{b^2 + \omega^2} + V(x, y)$ . Ici,  $b$  est le champ magnétique fort,  $\omega > 0$  fixé et le potentiel  $V$  s'annule à l'infini. Alors, nous obtenons un développement asymptotique complet en puissances de  $\frac{1}{b}$  de la trace de  $f(P_1(b, \omega))$  lorsque  $b \rightarrow \infty$ , pour certaine fonction  $f$  à support compact. Nous prouvons de plus l'asymptotique du type Weyl de la fonction de comptage des valeurs propres au-dessous du spectre essentiel de  $P_1(b, \omega)$  lorsque  $b \rightarrow \infty$ .

**Le Hai Yen**

### **A variational look at the rank function**

In this talk, we present our reflections and recent results on the analysis of the so-

called **rank minimization problems**. The archetype of such problems is as follows:

$$(\mathcal{P}) \quad \begin{cases} \text{Minimize } f(A) := \text{rank of } A \\ \text{subject to } A \in \mathcal{C}, \end{cases}$$

where  $\mathcal{C}$  is a subset of  $\mathcal{M}_{m,n}(\mathbb{R})$  (the vector space of  $m$  by  $n$  real matrices). A related (or cousin) problem, actually equivalent in terms of difficulty, stated in  $\mathbb{R}^n$  this time, consists in minimizing the so-called counting function  $x = (x_1, \dots, x_n) \mapsto c(x) :=$  number of nonzero components  $x_i$  in  $x$ :

$$(\mathcal{Q}) \quad \begin{cases} \text{Minimize } c(x) \\ \text{subject to } x \in S, \end{cases}$$

where  $S$  is a subset of  $\mathbb{R}^n$ .

Problems  $(\mathcal{P})$  and  $(\mathcal{Q})$  share some bizarre and/or interesting properties. The first one, well documented and used, concerns the relaxed forms of them. We propose here further developments and results like:

- (*Global optimization*) Every admissible point in  $(\mathcal{P})$  or  $(\mathcal{Q})$  is a local minimizer.
- (*Moreau-Yosida approximations*) The Moreau-Yosida approximates of the objective functions in  $(\mathcal{P})$  or  $(\mathcal{Q})$ , as well as the associated proximal mappings, can be explicitly calculated (in spite of the inherent nonconvexities and discontinuities).
- (*Generalized subdifferentials*) The generalized subdifferentials of the rank function can be determined. Actually, all the main ones (proximal, Fréchet, viscosity, limiting, Clarke's) coincide and their common value is a vector subspace.

## Tài liệu

- [1] J.-B.HIRIART-URRUTY and H.Y.LE, *Convexifying the set of matrices of bounded rank. Applications to quasiconvexification and convexification of the rank function*, Optimization Letters (DOI: 10.1007/s11590-011-0304-4), 2011.

- [2] J.-B.HIRIART-URRUTY, *When only global optimization matters*. J.of Global Optimization, to appear in 2011.
- [3] HAI YEN LE, *The generalized subdifferentials of the rank function*. Submitted, 2011.

**Le Quy Thuong**

**On the integral identity conjecture of Kontsevich and Soibelman**

Kontsevich and Soibelman recently introduced an important theory of motivic Donaldson-Thomas invariants for non-commutative 3 dimensional Calabi-Yau varieties on the foundations of derived Hall algebra and motivic integration. Nevertheless, such invariants are not obviously available because of a so-called integral identity conjecture being on the consideration. In this talk we mention to this conjecture as well as some advances in the studies which concern. Namely, we prove the full version in the ample scope of formulas of Guibert-Loeser-Merle on motivic Milnor fibers, and do the  $\ell$ -adic version for polynomials in terms of the analytic geometry of Berkovich.

**Le Vi**

**Nguyen Bich Thuy**

**Etude d'un ensemble singulier associé à une application polynomiale**

Dans leur article (prépublication) "*Geometry of polynomial mappings at infinity via intersection homology*", Anna et Guillaume Valette ont construit une pseudovariété  $N_F$  associée à une application polynomiale  $F : \mathbb{C}^2 \longrightarrow \mathbb{C}^2$  de jacobienne partout non nulle. Ils ont montré que si l'homologie d'intersection de  $N_F$  n'est pas triviale alors  $F$  n'est pas isomorphisme. Cet exposé donne une méthode pour stratifier l'ensemble  $N_F$  et calculer son homologie d'intersection.

**Nguyen Phuoc Thai**

## Boundary singularities of solutions to elliptic Hamilton-Jacobi equations

We study the boundary value problem with measures for (E1)  $-\Delta u + g(|\nabla u|) = 0$  in a bounded domain  $\Omega$  in  $\mathbb{R}^n$ , satisfying (E2)  $u = \mu$  on  $\partial\Omega$  prove that if  $g \in L^1(1, \infty; t^{(2N+1)/N} dt)$  is nondecreasing (E1)-(E2) can be solved with any positive bounded measure. When  $g(r) \geq r^q$  with  $q > 1$  we prove that any positive function satisfying (E1) admits a boundary trace which is an outer regular Borel measure, not necessarily bounded. When  $g(r) = r^q$  with  $1 < q < q_c = (N + 1)/N$  we prove the existence of a positive solution with a general outer regular Borel measure  $\nu \neq \infty$  as boundary trace and characterize the boundary isolated singularities of positive solutions. When  $g(r) = r^q$  with  $q_c \leq q < 2$  we prove that a necessary condition for solvability is that  $\mu$  must be absolutely continuous with respect to the Bessel capacity  $C_{2-q/q, q'}$ . We also characterize boundary removable sets for moderate and sigma-moderate solutions.

**Pham Viet Hung**

## Bounds for the tail of the maximum of the Gaussian fields

The problem of finding the distribution of the maximum of a random field has many applications in spatial statistics. By using the Rice formulas developed by J.M. Azais and M. Wschebor [2] and extending the record method of C. Mercadier [5], we give some approximations of this distribution in the case of stationary Gaussian field for very general parameter sets. In dimension 2, we provide an upper bound and a lower bound for the tail of the distribution at each level and prove that it is the exactly asymptotic result. In dimension 3, from the result of the expectation of the absolute value of quadratic forms by W. Li and A. Wei [3], some similar results are obtained.

### References

- [1] R.J. Adler and J. Taylor, Random fields and Geometry, Springer, New York, 2007.
- [2] J.M. Azais and M. Wschebor, Level sets and extrema of random processes

and fields, John Wiley and Sons, 2009.

[3] W. Li and A. Wei, Gaussian integrals involving absolute value functions, IMS lecture Notes-Monograph Series, 2009.

[4] M.L. Mehta, Random matrices, 3rd ed, Academic Press, San Diego, CA, 2004.

[5] C. Mercadier, Numerical bounds for the distribution of the maximum of one- and two-dimensional processes, Adv.Apl. Probab. 38(1), 149-170, 2006.

**Phan Quoc Hung**

### **Liouville type theorems and bounds of solutions for Hardy-Henon elliptic systems**

We consider the Hardy-Hénon system  $-\Delta u = |x|^a v^p$ ,  $-\Delta v = |x|^b u^q$  and we are concerned in particular with the Liouville property, i.e. the nonexistence of positive solutions in the whole space. In view of known results, it is a natural conjecture that this property should be true if and only if  $(N + a)/(p + 1) + (N + b)/(q + 1) > N - 2$ . We prove the conjecture for dimension  $N = 3$  in the case of bounded solutions and in dimensions  $N \leq 4$  when  $a, b \leq 0$ , among other partial nonexistence results. As applications, we give results on singularity and decay estimates as well as a priori bounds of positive solutions."

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**Phan Tan Nam**

**Phung Van Manh**

**Constructing good points for polynomial interpolation**

We estimate the growth of the Lebesgue constants of Leja sequences for the unit disk and of  $\Re$ -Leja sequences. The main application is the explicit construction of multivariate interpolation points whose Lebesgue constant grows like a polynomial.

**Tran Nam Trung**

**Regularity index of Hilbert functions of powers of ideals**

Let  $I$  be a homogeneous ideal of a Noetherian standard graded algebra  $A$  over an Artinian ring  $A_0$ , and let  $M$  be a finitely generated graded  $A$ -module. It is shown that the regularity index of the Hilbert function of  $I^n M$  is a linear function of  $n$  for all  $n$  large enough.

**Vu Cong Ban**

**Résolution d'inclusions monotones composites**

Nous proposons un cadres général pour résoudre des inclusions composites pour les opérateurs maximalelement monotones et cocoercifs. La convergence des algorithmes est démontrée dans des espaces hilbertiens réels. Des liens avec des méthodes existantes sont obtenus.

**B. C Vũ**, A splitting algorithm for dual monotone inclusions involving cocoercive operators, Adv. Comput. Math., à paraître.