

Bihamiltonian Formulation of the Whitham Hierarchy

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Abstract. The genus-zero Whitham hierarchy, originally introduced by Krichever in 1994, is a family of dispersionless evolutionary PDEs for an infinite number of dependent variables, which arises from the Whitham averaging method. It is an extension of the dispersionless KP hierarchy and is related, by reduction, to the dispersionless limit of several important integrable systems, such as the KdV, Gelfand–Dickey and constrained KP hierarchies. Using the R-matrix techniques originally developed by Semenov-Tian-Shansky et al., we construct a family of bihamiltonian structures on the algebra of $(m+1)$ -tuples of formal Laurent series, with an R-matrix associated with a splitting of this algebra in two subalgebras. By Dirac reduction, we obtain an infinite family, indexed by $m+1$ positive integers, of bihamiltonian structures for the Whitham hierarchy. Finally, we show how these bihamiltonian structures correspond to the flat metric and intersection form of a recently introduced family of infinite-dimensional Frobenius manifolds, thereby providing an explicit bihamiltonian formulation of their principal hierarchies.

Motivic invariants for real surfaces

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Abstract. Enumerative invariants are hard to get if one does not work on an algebraically closed field. The stable homotopy of Nisnevich sheaves gives a more general setup and the possibility to transfer the classical constructions (Chern classes in Chow groups) to the Milnor-Witt (co)homology. In good cases, this gives us a refinement of the classical result with quadratic forms over a field (almost arbitrary). The ideas will be explained through the examples of del Pezzo surfaces.

Trisections des variétés de dimension 4, formes d’intersection et mapping class group

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Abstract. Les trisections permettent de ramener l’étude de la topologie des 4-variétés à celle du mapping class group. En se restreignant à certaines familles de 4-variétés et à certains sous-groupes du mapping class group, il est alors possible d’utiliser les trisections pour redémontrer des résultats concernant les formes d’intersection.

Normalised solutions to mass supercritical Schrödinger equations with large radial potentials

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Abstract. We consider the stationary non linear Schrödinger equation with potential and mass supercritical power nonlinearity. For radial non trapping large potentials we deduce the existence of *normalised* solutions for small explicit masses. Moreover we explicit precise qualitative behaviour as the Lagrange multiplier tends to infinity.

Shifted wave equation on non-compact symmetric spaces

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Abstract. We study the Laplace-Beltrami operator Δ on the symmetric spaces G/K . We obtain pointwise estimates for the kernel of an oscillating function $\exp(itp|x|)\psi(x)$ applied to the shifted $\Delta + |\rho|^2$, a case not available before. Our results yield a polynomial decay in time of the kernel and of the $L^{p'} - L^p$ norms of the operator, for $2 < p < \infty$.

A1-Contractibility

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Abstract. We will learn about the notion of contractible spaces in algebraic geometry via the realm of motivic homotopy theory. In particular, we present a characterization of smooth (affine) schemes in this framework over fields and later over Dedekind schemes. This characterization fails in higher dimensions as witnessed by some exotic varieties which we illustrate alongside.