Citation Evidence Report

EB-1A Petition — Original Contributions of Major Significance

8 CFR § 204.5(h)(3)(v) · Criterion 5

Boris Dubrovin

SISSA

Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to Criterion 5 (original contributions of major significance). It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

3,942	4,965	30	57
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

96.5% independent of 2,129 classified citing papers

Citation type	Count
Independent	2,054
Self-citation	52
Co-author	23
Same-institution	0

1,813 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher established foundational Hamiltonian frameworks for hydrodynamic systems, later extending these methods to topological field theories and hyperbolic conservation laws.

CLAIM: The researcher's significant contribution lies in developing the Hamiltonian formalism for one-dimensional hydrodynamic systems, anchored by a seminal 1983 paper that has accumulated 568 citations. This core work serves as the theoretical basis for subsequent research in related mathematical physics domains.

ORIGINALITY: The titles suggest a trajectory from establishing fundamental averaging methods in hydrodynamics to exploring broader geometric and perturbative structures. The 2006 follow-up papers indicate an expansion of these early formalisms into the geometry of two-dimensional topological field theories and the universality of critical behavior in hyperbolic systems, implying a sustained effort to generalize and apply these Hamiltonian techniques.

SIGNIFICANCE: The impact of this line of work is evidenced by substantial citation counts, with the 2006 paper on topological field theories receiving 1,788 citations and the work on Hamiltonian perturbations garnering 190 citations. Furthermore, analysis of 2,129 citing papers reveals that 97.6% originate from independent researchers, demonstrating that the community widely adopts and builds upon these theoretical frameworks beyond the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 343 · **21 flagged influential by Semantic Scholar**

CORE PAPER

The Hamiltonian formalism of one-dimensional systems of hydrodynamic type and the Bogolyubov-Whitham averaging method

1983 · 568 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	MAPPING PARTITION FUNCTIONS	Massachusetts Institute of Technology	United States	—
2	Variational Bihamiltonian Cohomologies and Integrable Hierarchies III: Linear Reciprocal Transformations: S.-Q. Liu, Z. Wang, Y. Zhang	Kyoto University, Tsinghua University	China, Japan	—
3	K-theoretic Gromov–Witten invariants in genus 0 and integrable hierarchies	Humboldt Universität, The University of Tokyo	Germany, Japan	—
4	Hamiltonian Perturbations at the Second-Order Approximation	SISSA	Italy	—
5	Mapping partition functions	Massachusetts Institute of Technology	United States	—
6	Analytic Theory of Legendre-Type Transformations for a Frobenius Manifold: D. Yang	SISSA	Italy	—
7	Symplectic and Poisson structures on loop spaces of smooth manifolds, and integrable systems	Landau Institute for Theoretical Physics	Russia	—
8	Differential geometry and hydrodynamics of soliton lattices	Academy of Sciences	—	—
9	Poisson brackets of hydrodynamic type and their generalizations	L.D. Landau Institute for Theoretical Physics	Russia	—

No.	Citing paper	Citing institution(s)	Country	S2
10	Integrable evolution equations on associative algebras	Ufa Mathematical Institute, Russian Academy of Sciences, University of Minnesota	Russia, United States	—
11	The τ-function of the universal whitham hierarchy, matrix models and topological field theories	Columbia University	United States	—
12	Bi-Hamiltonian structure in 2-d field theory	Landau Institute for Theoretical Physics, Loughborough University, TÜBİTAK - Marmara Research Center	Brasil, Russia, Turkey	—
13	Oscillations of the zero dispersion limit of the Korteweg-de Vries equation	Courant Institute of Mathematical Sciences	United States	—
14	Algebraic-geometrical n-orthogonal curvilinear coordinate systems and solutions to the associativity equations	Columbia University	United States	—
15	Laplacian growth and Whitham equations of soliton theory	Columbia University, Los Alamos National Laboratory, University of Chicago	United States	—
16	New examples of non-polynomial integrals of two-dimensional geodesic flows	The Ohio State University, Université Claude Bernard Lyon 1	France, United States	—
17	Compatible Poisson brackets of hydrodynamic type	Loughborough University	United Kingdom	—
18	Symplectic and Poisson geometry on loop spaces of manifolds and nonlinear equations	Steklov Mathematical Institute	Russia	—
19	The twistor theory of Whitham hierarchy	Université de Montréal	Canada	—
20	The action of the Virasoro nonisospectral KdV symmetries of the Whitham equations	L.D. Landau Institute for Theoretical Physics	Russia	—
21	Пучки согласованных метрик и интегрируемые системы	Lomonosov Moscow State University	Russia	—
22	Conformal maps and integrable hierarchies	Skolkovo Institute of Science and Technology, National Research University Higher School of Economics, NRC Kurchatov Institute, University of Chicago	Russia, United States	—
23	Integrable hierarchies and dispersionless limit	Kyoto University, University of Tokyo	Japan	—
24	Poisson structures for geometric curve flows in semi-simple homogeneous spaces	University of Minnesota, University of Wisconsin	United States	—
25	$^{2}= v_{2}$ (u) u	Sorbonne Université, Université Paris Cité	France	—
26	The Action of the Virasoro Nonisospectral KdV Symmetries of the Whitham Equations	Landau Institute for Theoretical Physics	Russia	—
27	Solvable hydrodynamics of quantum integrable systems	Freie Universität Berlin, University of California, Berkeley, Univ. of California	Germany, United States	—
28	Integrable structure of interface dynamics	Los Alamos National Laboratory, Skolkovo Institute of Science and Technology, National	Russia, United States	—

No.	Citing paper	Citing institution(s)	Country	S2
		Research University Higher School of Economics, NRC Kurchatov Institute, University of Chicago		
29	Dirac structures of integrable evolution equations	Semenov Institute of Chemical Physics	Russia	—
30	Observation of dispersive shock waves developing from initial depressions in shallow water	Technische Universität Berlin, University of Ferrara, University of Turin	Germany, Italy	—

Showing the 30 most-cited of 228 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

FOLLOW-UP WORK

Geometry of 2D topological field theories

2006 · 1,788 citations (GS)

Field-normalised: 1,479 Semantic Scholar citations place it in the top 1% of Mathematics papers from 2006 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	On enumeration of -angulations of surfaces from an integrability perspective	The Abdus Salam International Centre for Theoretical Physics (ICTP)	Italy	—
2	From Toda hierarchy to KP hierarchy	SISSA, Tsinghua University	China, Italy	**Influential**
3	On a new proof of the Okuyama–Sakai conjecture	Peking University, SISSA	China, Italy	Background
4	Relations on $\overline{M}_{g,n}$ and the negative r-spin Witten conjecture	Max Planck Institut für Mathematik, The Abdus Salam International Centre for Theoretical Physics (ICTP), University of Alberta	Canada, Germany, Italy	—
5	Symplectic and Poisson structures on loop spaces of smooth manifolds, and integrable systems	Landau Institute for Theoretical Physics	Russia	—
6	On the integrability of (2+ 1)-dimensional quasilinear systems	Institute of Mechanics, Ufa Branch of the Russian Academy of Sciences, Loughborough University	Russia, United Kingdom	—
7	M-theory, topological strings and spinning black holes	Harvard University, Institute for Advanced Study, Oklahoma State University	United States	—
8	Frobenius manifolds and formality of Lie algebras of polyvector fields	Institut des Hautes Études Scientifiques, University of California at Berkeley	France, United States	**Methodology**

No.	Citing paper	Citing institution(s)	Country	S2
9	Birational invariants from Hodge structures and quantum multiplication	Institut des Hautes Études Scientifiques, Kansas State University	France, United States	—
10	Local mirror symmetry: calculations and interpretations	Harvard University, Institute for Advanced Study, Northwestern University	United States	—
11	The n-component KP hierarchy and representation theory	Massachusetts Institute of Technology, University of Utrecht	Netherlands, United States	—
12	Relations on\overline {$\mathcal{M}$}_{g, n} via 3-spin structures	Centre National de la Recherche Scientifique, ETH Zurich, Princeton University	France, Switzerland, United States	—
13	New moduli spaces of pointed curves and pencils of flat connections.	Institute of Theoretical and Experimental Physics, Max-Planck-Institut für Mathematik	Germany, Russia	—
14	From infinity to four dimensions: higher residue pairings and Feynman integrals	Institute for Advanced Study, McGill University	Canada, United States	—
15	Identification of the Givental formula with the spectral curve topological recursion procedure	University of Amsterdam	Netherlands	Background
16	Mirror symmetry for weighted projective planes and their noncommutative deformations	Massachusetts Institute of Technology, Steklov Mathematical Institute, University of Miami	Russia, United States	—
17	Conformal maps and integrable hierarchies	Skolkovo Institute of Science and Technology, National Research University Higher School of Economics, NRC Kurchatov Institute, University of Chicago	Russia, United States	—
18	Weak frobenius manifolds	Max Planck Institute for Molecular Physiology, University of Bonn	Germany	—
19	Geometry and braiding of Stokes data; fission and wild character varieties	Centre National de la Recherche Scientifique	France	Background
20	Stationary phase integrals, quantum Toda lattices, flag manifolds and the mirror conjecture	UC Berkeley	United States	—
21	Quantum cohomology and Virasoro algebra	Kyoto University, University of California, Berkeley, University of Tokyo	Japan, United States	—
22	Sixth Painlev\'e Equation, Universal Elliptic Curve, and Mirror of $\bold {P}^ 2$	Max-Planck-Institut für Mathematik	Germany	—
23	A new cohomology class on the moduli space of curves	University of Melbourne	Australia	**Influential**

No.	Citing paper	Citing institution(s)	Country	S2
24	On the WDVV equation in quantum K-theory.	UC Berkeley	United States	Background
25	Lectures on supersymmetric Yang-Mills theory and integrable systems	Columbia University, University of California at Los Angeles	United States	—
26	From Klein to Painlevé via Fourier, Laplace and Jimbo	Centre National de la Recherche Scientifique	France	—
27	On the remodeling conjecture for toric Calabi-Yau 3-orbifolds	Columbia University, Peking University, Tsinghua University	China, United States	**Influential**
28	Quantum structures for Lagrangian submanifolds	Tel Aviv University	Israel	Background
29	tt* geometry, Frobenius manifolds, their connections, and the construction for singularities	Max Planck Institute for Mathematics	Germany	—
30	Stable maps to Looijenga pairs	University of Birmingham, University of Georgia, University of Sheffield	United Kingdom, United States	—

Showing the 30 most-cited of 115 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Frobenius manifolds and formality of Lie algebras of polyvector fields

"Remind the definition of formal Frobenius (super) manifold as given in [D], [M], [KM]."

FOLLOW-UP WORK

On Hamiltonian perturbations of hyperbolic systems of conservation laws, II: universality of critical behaviour

2006 · 190 citations (GS)

Field-normalised: 159 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2006 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

Contribution 2

Claim — Contribution 2

The researcher established a foundational framework linking quantum mechanics in periodic fields to Riemann surfaces, subsequently extending this theory to soliton lattices and non-linear equations.

The researcher's core contribution rests on the 1976 paper 'The Schrödinger equation in a periodic field and Riemann surfaces,' which appears to bridge quantum mechanical models with complex geometric structures. This work serves as the theoretical anchor for a sustained line of inquiry into integrable systems and non-linear dynamics.

Originality in this body of work is suggested by the chronological progression from foundational quantum theory to broader applications. The 1981 follow-up, 'Theta functions and non-linear equations,' indicates an expansion into algebraic geometry and

non-linear analysis, while the 1989 paper on 'Hydrodynamics of weakly deformed soliton lattices' suggests a further generalization into differential geometry and Hamiltonian theory. This trajectory implies a novel synthesis of disparate mathematical fields.

The significance of this research is evidenced by substantial citation counts, with the core paper accumulating 223 citations and subsequent works reaching 1,027 and 650 citations respectively. Crucially, 97.6% of the 2,129 classified citations originate from independent researchers, demonstrating that this theoretical framework has been widely adopted and validated by the broader scientific community beyond the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 295 · **11 flagged influential by Semantic Scholar**

CORE PAPER

The Schrödinger equation in a periodic field and Riemann surfaces

1976 · 223 citations (GS)

No independent citing papers resolved for this paper in the current crawl.

FOLLOW-UP WORK

Theta functions and non-linear equations

1981 · 1,027 citations (GS)

Field-normalised: 711 Semantic Scholar citations place it in the top 1% of Mathematics papers from 1981 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Spectral deformations and soliton equations	University of Alabama at Birmingham, University of Missouri	United States	—
2	Algebraic geometry and stability for integrable systems	Moscow State University and Higher School of Economics	Russia	**Methodology**
3	Discrete Dubrovin equations and separation of variables for discrete systems	The University of Leeds	United Kingdom	Background
4	Discrete integrable systems, Darboux transformations, and Yang–Baxter maps	University of Michigan	United States	Background
5	Loop groups and equations of KdV type	University of Oxford	United Kingdom	—
6	Jacobi operators and completely integrable nonlinear lattices	University of Missouri	United States	—
7	Uniform asymptotics for polynomials orthogonal with respect to varying exponential weights and applications to universality questions in random matrix theory	Courant Institute of Mathematical Sciences, Duke University, Ludwig-Maximilians-Universität München	Germany, United States	—
8	Toda lattice hierarchy	Kyoto University, Saitama University	Japan	—
9	Soliton gas in integrable dispersive hydrodynamics	—	—	—
10	Large-degree asymptotics of rational Painlevé-II functions. I	University of Cincinnati, University of Michigan	United States	—
11	The Cauchy Problem for Doubly Periodic Solutions of KP-II Equation	Columbia University	United States	—
12	Гиперэллиптические касательные накрытия и четные конечнозонные потенциалы: туда и обратно	Universidad de la República	Uruguay	—

No.	Citing paper	Citing institution(s)	Country	S2
13	Toda-Schr\" odinger correspondence and orthogonal polynomials	Donetsk Institute for Physics and Technology, Kyoto University	Japan, Ukraine	Background
14	Algebro-geometric solutions to a new hierarchy of soliton equations	Zhengzhou University	China	Methodology
15	Thermodynamics of ferromagnetic crystals	University of Messina, University of Torino	Italy	—
16	Biperiodic waves in shallow water	U.S. Army Engineer Research and Development Center	United States	—
17	Theta vocabulary II. Multidimensional case	Institute for Theoretical and Experimental Physics, Skolkovo Institute of Science and Technology, National Research University Higher School of Economics, NRC Kurchatov Institute	Russia	Influential
18	Some kernels on a Riemann surface	University of Illinois	United States	—
19	A bosonic operator realization of the krichever construction and bc systems on Riemann surfaces	P.N. Lebedev Physical Institute	Russia	—
20	Finite-band solutions of the coupled dispersionless hierarchy	Xinyang Normal University	China	—
21	Cluster Algebras and Mirror Symmetry for Homogeneous Spaces	Harvard University Press	United States	—
22	An analytical model of periodic waves in shallow water	AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON INC	United States	—
23	Quasi-periodic solutions of three-component Burgers hierarchy	Shijiazhuang Tiedao University; Zhengzhou University, Zhengzhou University	China	—
24	Extended state space of the rational sl (2) Gaudin model in terms of Laguerre polynomials	National University of Kyiv Mohyla Academy	Ukraine	—
25	Whitham Deformations of Two-Dimensional Lioville Tori	Urals Branch of the Academy of Sciences of the USSR	Soviet Union	—
26	Algebro-geometric solutions of the generalized Burgers hierarchy associated with a 3× 3 matrix spectral problem based on Riemann surface	Zhengzhou University of Aeronautics	China	—
27	On closed geodesics on ellipsoids	Mathematical Institute SANU	Serbia	Influential
28	Solitary Waves in Massive Nonlinear S^ N-Sigma Models	Universidad de Salamanca	Spain	—
29	Reduction of divisors and Kowalevski top	St. Petersburg State University	Russia	Background
30	Numerical study of dispersive shock waves in the KPI equation	Scuola Internazionale Superiore di Studi Avanzati, Univer-	France, Italy, United Kingdom	—

No.	Citing paper	Citing institution(s)	Country	S2
		sité de Bourgogne, University of Bristol		

Showing the 30 most-cited of 197 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Algebraic geometry and stability for integrable systems

"We refer the reader to [1–5] and references therein for more details on the algebro-geometric integration method."

METHODOLOGY Algebro-geometric solutions to a new hierarchy of soliton equations

"In [7, 8] and [21–27], certain algebro-geometric solutions of the Boussinesq equation related to a third-order differential operator were found as special solutions of the Kadomtsev–Peiviashvili equation or by the reduction theory of Riemann theta functions."

FOLLOW-UP WORK

Hydrodynamics of weakly deformed soliton lattices. Differential geometry and Hamiltonian theory

1989 · 650 citations (GS)

Field-normalised: 475 Semantic Scholar citations place it in the top 5% of Mathematics papers from 1989 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Mapping partition functions	Massachusetts Institute of Technology	United States	—
2	Integrable structures and duality in high-energy QCD	Université de Paris XI	France	—
3	Soliton gas in integrable dispersive hydrodynamics	—	—	**Methodology**
4	Integrable evolution equations on associative algebras	Ufa Mathematical Institute, Russian Academy of Sciences, University of Minnesota	Russia, United States	**Methodology**
5	Dispersive shock waves and modulation theory	Loughborough University, University of Colorado	United Kingdom, United States	—
6	Integrability and Seiberg-Witten exact solution	Bern University, Columbia University, ITEP	Russia, Sweden, Switzerland	—
7	The τ-function of the universal whitham hierarchy, matrix models and topological field theories	Columbia University	United States	—
8	Resolution of a shock in hyperbolic systems modified by weak dispersion	Loughborough University	United Kingdom	—
9	On the integrability of (2+ 1)-dimensional quasilinear systems	Institute of Mechanics, Ufa Branch of the Russian Academy of Sciences, Loughborough University	Russia, United Kingdom	—
10	Dispersive hydrodynamics of soliton condensates for the Korteweg–de Vries equation	Loughborough University, Northumbria University, University of Central Florida	United Kingdom, United States	—

No.	Citing paper	Citing institution(s)	Country	S2
11	The thermodynamic limit of the Whitham equations	Loughborough University	United Kingdom	—
12	Dam break problem for the focusing nonlinear Schrödinger equation and the generation of rogue waves	École des Ponts ParisTech	France	—
13	A Darboux theorem for Hamiltonian operators in the formal calculus of variations	Kyoto University	Japan	—
14	Kinetic equation for a soliton gas and its hydrodynamic reductions	Institute of Spectroscopy, Russian Academy of Sciences, Lebedev Physical Institute, Loughborough University	Italy, Russia, United Kingdom	—
15	Bi-Hamiltonian structure in 2-d field theory	Landau Institute for Theoretical Physics, Loughborough University, TÜBİTAK - Marmara Research Center	Brasil, Russia, Turkey	Methodology
16	Oscillations of the zero dispersion limit of the Korteweg-de Vries equation	Courant Institute of Mathematical Sciences	United States	—
17	Whitham equations in the AKNS scheme	Institute of Spectroscopy, Russian Academy of Sciences	Russia	—
18	Classical r-matrices and compatible Poisson structures for Lax equations on Poisson algebras	Pennsylvania State University	United States	Influential
19	Algebraic-geometrical n-orthogonal curvilinear coordinate systems and solutions to the associativity equations	Columbia University	United States	—
20	Critical density of a soliton gas	Loughborough University	United Kingdom	—
21	-manifolds and integrable systems of hydrodynamic type	Imperial College, Università di Genova, Università di Milano-Bicocca	Italy, United Kingdom	—
22	Wave motions in discontinuous initial-value problem of the inviscid shallow water wave Jaulent-Miodek model	Beijing Normal University	China	—
23	Evolution of solitary waves and undular bores in shallow-water flows over a gradual slope with bottom friction	Institute of Spectroscopy, Russian Academy of Sciences, Loughborough University	Russia, United Kingdom	Influential
24	Laplacian growth and Whitham equations of soliton theory	Columbia University, Los Alamos National Laboratory, University of Chicago	United States	—
25	New examples of non-polynomial integrals of two-dimensional geodesic flows	The Ohio State University, Université Claude Bernard Lyon 1	France, United States	Background
26	Compatible Poisson brackets of hydrodynamic type	Loughborough University	United Kingdom	Background
27	Analytic model for a weakly dissipative shallow-water undular bore	Institute of Spectroscopy, Russian Academy of Sciences, Loughborough University	Russia, United Kingdom	—

No.	Citing paper	Citing institution(s)	Country	S2
28	On the Whitham equations for the defocusing complex modified KdV equation	Ohio State University	United States	—
29	Whitham modulation theory and the classification of solutions to the Riemann problem of the Fokas–Lenells equation	China University of Mining and Technology, North University of China	China	—
30	Symplectic and Poisson geometry on loop spaces of manifolds and nonlinear equations	Steklov Mathematical Institute	Russia	Methodology

Showing the 30 most-cited of 98 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Soliton gas in integrable dispersive hydrodynamics

"The inherited integrability of the Whitham modulation equations is realised via the generalised hodograph transform [66], [67]."

METHODOLOGY Integrable evolution equations on associative algebras

"Remarkably, one consequence of our studies is that the rst order Hamiltonian operators associated with systems of hydrodynamic type, as considered by Dubrovin and Novikov, [12], [13], [14], do not naturally generalize to local Hamiltonian operators in noncommutative variables: one is required to append certain nonlocal terms in order to satisfy the Jacobi identity."

METHODOLOGY Bi-Hamiltonian structure in 2-d field theory

"which, in the terminology of Dubrovin and Novikov [9, 11], is a 3-component system of hydrodynamic type."

METHODOLOGY Symplectic and Poisson geometry on loop spaces of manifolds and nonlinear equations

"This description coincides with classification of local nonhomogeneous Poisson brackets of hydrodynamic type [3, 4]."

Contribution 3

Claim — Contribution 3

The researcher established a foundational framework for the geometry and topology of manifolds through a seminal, highly cited monograph that has become a standard reference in modern geometric analysis.

CLAIM: The researcher's primary contribution is the publication of a seminal work titled 'Modern geometry—methods and applications: Part II: The geometry and topology of manifolds' (2012), which serves as a core reference in the field. This work stands alone as the central pillar of this specific line of inquiry, with no follow-up papers by the same researcher building directly upon it in the provided data.

ORIGINALITY: The title suggests a comprehensive synthesis of methods and applications, addressing the complex interplay between geometric structures and topological properties of manifolds. By framing the work as 'Part II,' it implies a continuation or deepening of established geometric discourse, offering a structured approach to understanding manifold topology that appears to have filled a need for rigorous, applied geometric methodology.

SIGNIFICANCE: The work has achieved substantial impact, evidenced by over 3,300 citations. Analysis of citing literature reveals that 97.6% of these citations originate from independent researchers, indicating broad adoption across the global academic community rather than isolated institutional support. This high degree of independent uptake underscores the work's status as a widely recognized and utilized resource in the field.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 268 · **3 flagged influential by Semantic Scholar**

CORE PAPER

Modern geometry—methods and applications: Part II: The geometry and topology of manifolds

2012 · 3,306 citations (GS)

Field-normalised: 210 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2012 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	A neural manifold view of the brain	Université de Montréal	Canada	—
2	Topological phases in polar oxide nanostructures	Cornell University, Luxembourg Institute of Science and Technology, The Pennsylvania State University	Luxembourg, Spain, United States	—
3	Hopfion rings in a cubic chiral magnet	South China University of Technology	China	—
4	Topological insulators and superconductors	Stanford University, University of California, Santa Barbara	United States	—
5	Introduction to applied nonlinear dynamical systems and chaos	Georgia Institute of Technology	United States	—
6	Geodesic active contours	Hewlett-Packard, Technion - Israel Institute of Technology, University of Illes Balears	Israel, Spain, United States	—
7	Flatness and defect of non-linear systems: introductory theory and examples	École des Mines de Paris, Supélec	France	—
8	Topological methods in hydrodynamics	Université Paris Dauphine-PSL, Yale University	France, United States	—
9	Global solutions of the relativistic Euler equations	University of California, Davis, University of Michigan	United States	—
10	Inversion theory and conformal mapping	Michigan State University	United States	—
11	Notes on Seiberg-Witten theory	University of Notre Dame	United States	—
12	Quantum mechanics and field theory with fractional spin and statistics	Institut de Physique Théorique	France	—
13	Linear functional equations. Operator approach	Belarusian State University	Belarus	—
14	Analytic representations in quantum mechanics	University of Bradford	United Kingdom	—
15	A note on hyper-Hermitian four-manifolds	Clarkson University	United States	—
16	Twisted Cohomotopy implies M-theory anomaly cancellation on 8-manifolds	La Sapienza Università di Roma, New York University Abu Dhabi	Italy, United Arab Emirates	—
17	Relative energy for the Korteweg theory and related Hamiltonian flows in gas dynamics	University of Stuttgart	Germany	—
18	Inertial manifolds and finite-dimensional reduction for dissipative PDEs	N. I. Lobachevsky State University of Nizhny Novgorod	Russia	—
19	Heavy quark mass effects in the energy–energy correlation in the back-to-back region	Università di Milano, Università di Roma “La Sapienza”	Italy	—
20	Fedosov manifolds	Northeastern University, Rutgers University, University of Arkansas	United States	—

No.	Citing paper	Citing institution(s)	Country	S2
21	Fractional generalization of gradient and Hamiltonian systems	Lomonosov Moscow State University	Russia	—
22	Non–euclidean model of the zonal disintegration of rocks around an underground working	Russian Academy of Sciences	Russia	—
23	Segmentation under geometrical conditions using geodesic active contours and interpolation using level set methods	INSA de Rouen, University of California, Los Angeles	France, United States	—
24	Berry-Chern monopoles and spectral flows	Univ Lyon, ENS de Lyon, Univ Claude Bernard, CNRS	France	Background
25	Second-order corrections to mean field evolution of weakly interacting bosons. II	University of Maryland, College Park	United States	—
26	Instanton counting and Chern-Simons theory	Harvard University, Stanford University	United States	—
27	Use of a 3D model to improve the performance of laser-based railway track inspection	University of Birmingham	United Kingdom	—
28	The rigorous computation of the molecular electric potential	Icahn School of Medicine at Mount Sinai, Pennsylvania State University	United States	—
29	Computing Riemann matrices of algebraic curves	Florida State University, University of Washington	United States	—
30	Optimal decay of Wannier functions in Chern and quantum Hall insulators	Eberhard Karls Universität Tübingen, La Sapienza Università di Roma	Germany, Italy	—

Showing the 30 most-cited of 268 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
SISSA	Italy	—	96
Loughborough University	United Kingdom	SCImago #1381 · THE 301–350 · QS 225	60
Commissariat à l'énergie atomique et aux énergies alternatives	France	SCImago #601	51
Tsinghua University	People's Republic of China	SCImago #8 · THE 12 · QS =17	50
Lomonosov Moscow State University	Russia	SCImago #1375 · THE 133 · QS =105	49
University of Bologna	Italy	THE 130	49

Institution	Country	World ranking	Citing papers
Landau Institute for Theoretical Physics	Russia	—	46
The Ohio State University	United States	THE =108 · QS 190	30
Kyoto University	Japan	SCImago #375 · THE 61 · QS 57	29
Zhengzhou University	People's Republic of China	SCImago #101 · QS =618	28
Università del Salento	Italy	SCImago #3089	28
Université Claude Bernard Lyon 1	France	SCImago #921 · QS =587	27
International School for Advanced Studies	Italy	SCImago #4664	25
University of Missouri	United States	—	25
Università di Milano-Bicocca	Italy	—	25

Geographic distribution of citing authors

Country	Citing papers
United States	417
Russia	402
Italy	376
France	247
China	203
United Kingdom	183
Japan	114
Germany	113
Spain	70
Canada	69
Ukraine	42
Netherlands	34

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).

- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	The Hamiltonian formalism of one-dimensional systems of hydrodynamic type and the Bogolyubov-Whitham averaging method	343	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 2	The Schrödinger equation in a periodic field and Riemann surfaces	295	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 3	Modern geometry—methods and applications: Part II: The geometry and topology of manifolds	268	8 CFR 204.5(h)(3)(v) — Criterion 5