Gene Freudenburg

Curriculum Vitae, October 2026

Professor of Mathematics
Western Michigan University

Department of Mathematics
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EDUCATION

1992	Ph.D. Mathematics	Washington University in Saint Louis
1986	M.S. Mathematics	Saint Louis University
1982	B.A. Interdisciplinary Studies	Valparaiso University

APPOINTMENTS

Western Michigan University

2006 - present	Professor of Mathematics
2006 - 2015	Chair, Department of Mathematics
2010 - 2012	Interim Dean, The Graduate College

University of Southern Indiana

2005 - 2006	Associate Dean, Pott College of Science & Engineering
2005 - 2006	Professor of Mathematics
1999 - 2005	Associate Professor of Mathematics
1995 - 1999	Assistant Professor of Mathematics

Ball State University

1992 - 1995	Assistant Professor of Mathematics

RESEARCH AREAS

Commutative algebra, derivations of rings, affine algebraic geometry, automorphisms of affine spaces, group actions on affine varieties, invariant theory (MSC numbers 13,14)

BOOKS

G. Freudenburg, *Algebraic Theory of Locally Nilpotent Derivations*
Encyclopædia of Mathematical Sciences
Invariant Theory and Algebraic Transformation Groups, Volume VII
R. V. Gamkrelidze, V. L. Popov, Series Editors
Springer Verlag (Berlin, Heidelberg, New York)
First edition 2006, 261 pages; Second edition 2017, 319 pages

Polynomial Rings and Affine Algebraic Geometry
PRAAG 2018, Tokyo, Japan, Feb. 12-16
G. Freudenburg, S. Kuroda, N. Onoda, Volume Editors
Springer Proceedings in Mathematics & Statistics, Vol. 319
Springer Verlag (Berlin, Heidelberg, New York) 2020

EXTERNAL RESEARCH GRANTS

Agency: US National Science Foundation, Division of Mathematical Sciences
Project Title: *Algebraic Automorphisms of Affine Space*
Principal Investigator: G. Freudenburg
Award Amount: $61,275
Award Number: DMS 0101836
Dates: September 2001 to August 2005

RESEARCH ARTICLES

[38] R. Andries, J. Draisma, G. Freudenburg, G. Huang, F. Kutzschebauch, *A criterion for the algebraic density property of affine SL_2-manifolds*, Adv. Math. (to appear)

[37] G. Freudenburg, *Presentations, embeddings and automoprhisms of homogeneous spaces for $SL_2(\mathbb{C})$*, Math. Res. Letters (to appear)

[36] G. Freudenburg, T. Nagamine, *Affine and unirational unique factorization domains with unmixed gradings*, Kyoto J. Math. (to appear)

[35] R. Andries, G. Freudenburg, G. Huang, F. Kutzschebauch, J. Schott, *A criterion for the density property of Stein manifolds*, Michigan Math. J. **76** (2026) 1003-1026

[34] D. Daigle, G. Freudenburg, *Automorphisms of the ring of invariants of the binary quintic representation of SL_2*, Transform. Groups **31** (2026) 1273-1294

[33] G. Freudenburg, *Actions of $SL_2(k)$ on affine k-domains and fundamental pairs*, Transform. Groups **29** (2024) 959-1003

[32] D. Daigle, G. Freudenburg, T. Nagamine, *Generalizations of Samuels' criteria for a ring to be a unique factorization domain*, J. Algebra **594** (2022) 271-306

[31] A. Dubouloz, G. Freudenburg, L. Moser-Jauslin, *Smooth rational affine varieties with infinitely many real forms*, J. reine angew. Math. **771** (2021) 215-226

[30] G. Freudenburg, *The super-rank of a locally nilpotent derivation of a polynomial ring*, Springer Proc. Math. Stat. **319** (2020) 143-150

[29] G. Freudenburg, *Canonical factorization of the quotient morphism for an affine $\mathbb{G}_a$-variety*, Transform. Groups **24** (2019) 355-377

[28] G. Freudenburg, S. Kuroda, *Cable algebras and rings of $\mathbb{G}_a$-invariants*, Kyoto J. Math. **57** (2017) 325-363

[27] D. Daigle, G. Freudenburg, L. Moser-Jauslin, *Locally nilpotent derivations of rings graded by an abelian group*, Adv. Stud. Pure Math. **75** (2017), 29-48

[26] G. Freudenburg, *An affine version of a theorem of Nagata*, Kyoto J. Math. **55** (2015) 663-672

[25] G. Freudenburg, *Laurent cancellation for rings of transcendence degree one over a field*, Springer Proc. Math. Stat. **79** (2014), 313-326

[24] G. Freudenburg, *Foundations of invariant theory for the down operator*, J. Symbolic Comput. **57** (2013) 19-47

[23] G. Freudenburg, L. Moser-Jauslin, *Locally nilpotent derivations of rings with roots adjoined*, Michigan Math. J. **62** (2013) 227-258

[22] G. Freudenburg, *Bivariate analogues of Chebyshev polynomials with application to embeddings of affines spaces*, CRM Proc. Lecture Notes **54** (2011), 39-56

[21] D. Daigle, G. Freudenburg, *Families of affine fibrations*, in: Symmetry and Spaces, In Honor of Gerry Schwarz, 35-44, Progress in Mathematics **278**, Birkhäuser, Boston, 2010

[20] G. Freudenburg, *Derivations of $R[X, Y, Z]$ with a slice*, J. Algebra **322** (2009) 3078-3087

[19] G. Freudenburg, *A linear counterexample to Hilbert's Fourteenth Problem in dimension eleven*, Proc. Amer. Math. Soc. **135** (2007) 51-57

[18] G. Freudenburg, *Vénéreau polynomials relative to $\mathbb{C}^*$-vector bundles and stable coordinates*, in: Affine Algebraic Geometry, 203-215, Osaka University Press, Osaka, 2007

[17] G. Freudenburg, P. Russell, *Open problems in affine algebraic geometry*, Affine Algebraic Geometry 1-30, Contemp. Math. **369**, Amer. Math. Soc., Providence, RI, 2005.

[16] G. Freudenburg, L. Moser-Jauslin, *Real and rational forms of certain $O_2(\mathbb{C})$-actions, and a solution to the Weak Complexification Problem*, Transform. Groups **9** (2004) 257-272

[15] G. Freudenburg, L. Moser-Jauslin, *Embeddings of Danielewski surfaces*, Math. Z. **245** (2003) 823-834

[14] G. Freudenburg, L. Moser-Jauslin, *A non-linearizable S_3-action on $\mathbb{C}^4$*, Annals Fourier Inst. **52** (2002) 133-143

[13] G. Freudenburg, *A survey of counterexamples to Hilbert's Fourteenth Problem*, Serdica **27** (2001) 171-192

[12] D. Daigle, G. Freudenburg, *Triangular derivations of $k[X_1, X_2, X_3, X_4]$*, J. Algebra **241** (2001) 328-339

[11] G. Freudenburg, *Recent progress on Hilbert's Fourteenth Problem via triangular derivations*, Ann. Polon. Math. **76** (2001) 95-99

[10] D. Daigle, G. Freudenburg, *A note on triangular derivations of $k[X_1, X_2, X_3, X_4]$*, Proc. Amer. Math. Soc. **129** (2000) 657-662

[9] G. Freudenburg, *A counterexample to Hilbert's Fourteenth Problem in dimension six*, Transform. Groups **5** (2000) 61-71

[8] D. Daigle, G. Freudenburg, *A counterexample to Hilbert's Fourteenth Problem in dimension five*, J. Algebra **221** (1999) 528-535

[7] D. Daigle, G. Freudenburg, *Locally nilpotent derivations over a UFD and an application to rank two locally nilpotent derivations of $k[X_1, ..., X_n]$*, J. Algebra **204** (1998) 353-371

[6] G. Freudenburg, *Actions of $\mathbb{G}_a$ on $\mathbb{A}^3$ defined by homogeneous derivations*, J. Pure Appl. Algebra **126** (1998) 169-181

[5] G. Freudenburg, *Local slice constructions in $k[X, Y, Z]$*, Osaka J. Math. **34** (1997) 757-767

[4] G. Freudenburg, *A note on the kernel of a locally nilpotent derivation*, Proc. Amer. Math. Soc. **124** (1996) 27-29

[3] G. Freudenburg, *Triangulability criteria for additive group actions on affine space*, J. Pure Appl. Algebra **105** (1995) 267-275

[2] G. Freudenburg, *One-parameter subgroups and the triangular subgroup of the affine Cremona group*, Automorpshisms of Affine Spaces (Curacao, 1994), 201-213, Kluwer Acad. Publ., Dordrecht, 1995

[1] G. Freudenburg, *Three-dimensional analogues of the Nagata surfaces*, Comm. Algebra **23** (1995) 139-164

DOCTORAL DISSERTATION

On the Automorphism Group of the Polynomial Ring in Three Variables, Washington University in Saint Louis, 1992. David L. Wright, Advisor

SELECTED TALKS

Presentations, embeddings and automorphisms of homogeneous spaces for $SL_2(\mathbb{C})$
Michigan Algebraic Geometry Seminar, Michigan State University
East Lansing, Michigan (March 2026)

A criterion for the algebraic density property of affine $SL_2(\mathbb{C})$-manifolds
Mathematical Congress of the Americas 2025
Miami, Florida (July 2025)

Absolutely non-extendable group actions on affine varieties
2025 Joint Mathematics Meetings
Seattle, Washington (January 2025)

Free $\mathbb{G}_a$-actions of Winkelmann type
Basel-Dijon-EPFL Joint Seminar, Université de Bourgogne
Dijon, France (October 2022)

Actions of $SL_2(k)$ on affine k-domains via fundamental pairs
Algebra and Geometry Seminar, Department of Mathematics, University of Basel
Basel, Switzerland (September 2022)

Locally Nilpotent Derivations
1st Joint Brazil-France Meeting in Mathematics, Instituto de Matematica Pure e Aplicada
Rio de Janiero, Brazil (July 2019)

Finite Generation of Certain Graded Factorial Domains
Affine Algebraic Geometry and Transformation Groups, Université de Bourgogne
Dijon, France (May 2019)

The Polar Group of a Real Form of an Affine $\mathbb{C}$-Variety
Algebraic Geometry, Institute of Mathematics, Polish Academy of Sciences
Warsaw, Poland (May 2018)

Real Forms of Objects in Affine Algebraic Geoemetry
Mathematical Colloquia, University of Bern
Bern, Switzerland (May 2018)

Canonical Factorization of the Quotient Morphism for an Affine $\mathbb{G}_a$-Variety
Affine Geometry, Hyperbolicity, Complex Analysis, Fourier Institute
Grenoble, France (October 2016)

Two Cancellation Theorems for Rings of Transcendence Degree One
Affine Algebraic Geometry and the Jacobian Conjecture, Chern Institute of Mathematics
Tianjin, China (July 2014)

VISITING APPOINTMENTS

University of Bern, Mathematical Institute
Bern, Switzerland, September - December, 2022
Host: F. Kutzschebauch

Université de Bourgogne, Department of Mathematics
Dijon, France, June 2003 and June 2009
Host: L. Moser-Jauslin

Universität Basel, Department of Mathematics
Basel, Switzerland, June 2001
Host: H. Kraft

VISITORS HOSTED AT WMU

Takanori Nagamine, Niigata University, Japan
(Sep-Dec, 2018; Sep-Oct, 2019; Sep 2023; Sep 2025)
Hideo Kojima, Niigata University, Japan (Sep 2019)
Daniel Daigle, University of Ottawa, Canada (March 2019)
Dayan Liu, Jilin University, China (Aug 2018 to July 2019)
Xiaosong Sun, Jilin University, China (Aug 2018 to July, 2019)
Shigeru Kuroda, Tokyo Metropolitan University, Japan (Feb-March, 2007)

WORKSHOPS

EAGER 26th Autumn School in Algebraic Geometry
$\mathbb{C}^+$ *Actions on Affine Spaces and Locally Nilpotent Derivations*
Łukęcin, Poland, Sept. 14-20, 2003
Lecturers: D. Daigle and G. Freudenburg
Organized by M. Koras and J. Buczynski,
Institute of Mathematics, Warsaw University

PROFESSIONAL SERVICE

Referee Work

Algebra and Number Theory, Journal of Algebra, Journal of Algebraic Geometry, Bulletin of the London Mathematical Society, Comptes Rendus de l'Académie des Sciences, Journal of Pure and Applied Algebra, Transformation Groups, Communications in Algebra, Linear Algebra and Its Applications, Applied Mathematical Letters, American Mathematical Monthly, Forum Mathematicum, Journal of Symbolic Computation, Kyoto Journal of Mathematics, Progress in Mathematics, Glasgow Mathematical Journal, European Journal of Mathematics, Proceedings of the American Mathematical Society, Journal of Commutative Algebra, Michigan Mathematical Journal, Mathematische Annalen, International Mathematics Research Notices, Proceedings Mathematical Sciences (Springer), Publicacions Matemàtiques, International Mathematics Research Notices, New York Journal of Mathematics, Izvestiya: Mathematics

Review Work
Articles. Reviewer for *Mathematical Reviews* and *Zentralblatt Mathematik*
Grant Proposals. Reviewer for National Science Foundation (USA), National Security Agency (USA), American Mathematical Society (USA), National Organization for Scientific Research (The Netherlands), National Science Centre (Poland), Swiss National Science Foundation
Books. Book review, *American Mathematical Monthly* 103 (1996)

Conference Organization
Special Session: *Polynomial Rings and Affine Algebraic Geometry*
Joint Mathematics Meetings, Seattle, Washington, January, 2025
Organizers: G. Freudenburg, N. Gupta

Polynomial Rings and Affine Algebraic Geometry 2018
Tokyo Metropolitan University, Tokyo, Japan, February 2018
Organizers: G. Freudenburg, S. Kuroda, N. Onoda

Michigan Computational Algebraic Geometry 2013
Western Michigan University, Kalamazoo, Michigan, May 2013
Organizer: G. Freudenburg

Special Session: *Algebraic Group Actions on Affine Varieties*
Fall Central Section Meeting of the American Mathematical Society
University of Notre Dame, November 2010
Session Organizers: H. Derksen and G. Freudenburg

Fall Central Section Meeting of the American Mathematical Society
Western Michigan University, Kalamazoo, Michigan, October 2008
Local Organizer: G. Freudenburg

Special Session: *Geometry of Affine Space*
Spring Central Section Meeting of the American Mathematical Society
University of Louisville, March 1998
Session Organizers: G. Freudenburg and D.L. Wright

Dissertation Committees
M. DeBondt, Radboud University Nijmegen
The Netherlands, 2009 (Defense Committee)

B. Alhajjar, Universite de Bourgogne
France, 2015 (Rapporteur)

External Reviewer
Department of Mathematics, Northern Illinois University, 2012

AWARDS

2004 Distinguished Professor, University of Southern Indiana

The Distinguished Professor Award recognizes a university faculty member for excellence in teaching, scholarship, and service as well as those intangible personal qualities which inspire others. This award is the highest recognition bestowed upon a faculty member at the University of Southern Indiana. (From the Award Description)

UNIVERSITY SERVICE

Western Michigan University

2019 - present	Visiting Scholar and Artist Program Committee (Faculty Senate)
2023 - 2025	Executive Committee (Department of Mathematics); Chair 2025-66
2020 - 2022	Executive Committee (Department of Mathematics)
2019 - 2022	Graduate Studies Council (Faculty Senate); Council Chair 2021-22
2019 - 2020	Director, Algebra Seminar (Department of Mathematics)
2018 - 2020	Chair, Department Graduate Committee (Department of Mathematics)
2015 - 2020	Director of Colloquia (Department of Mathematics)
2016 - 2017	College Curriculum Committee (College of Arts & Sciences)
2012 - 2015	Chairs Council (College of Arts & Sciences)
2012 - 2015	WMU-STEP Advisory Board (Vice President, Academic Affairs)
2013	MLK 50th Anniversary Committee (Vice President, Diversity and Inclusion)
2010 - 2012	Provost Council (Vice President, Academic Affairs)
2010 - 2012	Graduate Studies Council (Faculty Senate)
2010 - 2012	Research Policies Council (Faculty Senate)
2010 - 2012	Graduate Student Advisory Committee (Faculty Senate)
2010 - 2012	Research Advisory Team (Vice President for Research)
2010 - 2012	SEM Committee (Vice Provost, Strategic Enrollment Mgt.)
2010 - 2012	Enrollment Forecast Committee (Vice Provost, Strategic Enrollment Mgt.)
2010 - 2012	MI-AGEP Steering Committee (Michigan AGEP Alliance)
2010	Search Committee, Lee Honors College Dean (Vice President, Academic Affairs)
2009 - 2010	4.1 Subcommittee, HLC Comprehensive Visit (Vice Provost, Inst. Effectiveness)
2006 - 2010	Chairs Council (College of Arts & Sciences)
2007 - 2009	Dissertation Completion Fellowship Committee (The Graduate College)
2006 - 2007	Graduate Studies Council (Faculty Senate)

University of Southern Indiana

2005 - 2006	Chair, College Promotions Committee (College of Science & Engineering)

GRANT ADMINISTRATION

Co-PI/PD 2011-2012
A Planning Grant to Enrich and Enlarge the Michigan AGEP Alliance
National Science Foundation, HRD-1110556
Project Dates: 2011-2012

Co-PI/PD 2010-2012
The Michigan AGEP Alliance
National Science Foundation, HRD-0450063
Project Dates: 2004-2012