

Andrew J. Sommese Department of Applied & Computational Math. and Stat. (ACMS)
University of Notre Dame Du Lac
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Positions held

2015–2018 Chair, Department of ACMS
2014–2015 Associate Chair, Department of ACMS
2011–2013 Director of Undergraduate Studies, Department of ACMS
2010–2011 Director of Graduate Studies, Department of ACMS
2005–2010 Director, Center for Applied Mathematics, Univ. of Notre Dame
1994–2019 Vincent J. and Annamarie Micus Duncan Professor of Mathematics
1988–1992 Chair, Department of Mathematics, Univ. of Notre Dame
1987–1991 Codirector, Center for Applied Mathematics, Univ. of Notre Dame
1983–2019 Full Professor, Univ. of Notre Dame
1979–1983 Associate Professor (with Tenure), Univ. of Notre Dame
1975–1979 Assistant Professor, Cornell University, Ithaca, New York
1973–1975 Josiah Willard Gibbs Instructor, Yale University, New Haven

Education

1969–1972 Princeton University, Princeton, New Jersey
Ph.D. Mathematics, June 1973 (supported by NSF Graduate Fellowship)
1972–1973 Harvard University, Cambridge, Massachusetts, Research Assistant
1966–1969 Fordham University, Bronx, New York
B.A. Mathematics, June 1969, (attended on a full scholarship)
Summer 1968 Indiana University, Bloomington, Indiana
NSF Summer Undergraduate Research Grant

Consulting General Motors Research Laboratories, Warren, Michigan
1986–1997 Consulting on the solution of polynomial systems of equations.

Editorships 1986–1993: *Manuscripta Mathematica*
2000–2015: *Advances in Geometry*
2011–2015: *Journal of Algebra and its Applications*
2001–2019: *Milan Journal of Mathematics*
2017– : *Mathematics in Computer Science*

National and International Honors

Serving on NSF Review Panels
1979 Alfred P. Sloan Research Fellowship
1993 Alexander von Humboldt Research Award for Senior U.S. Scientists
2010 International Deutsche Forschungsgemeinschaft Review Panel
Priority Programme SPP 1489/1 (Lambrecht, February 10-11) on
Algorithmic and Experimental Methods in Algebra, Geometry and Number Theory.
2011 2010 General Motors R & D Most Valued Colleague Award.
2012 AMS Fellow (American Mathematical Society)
2013 International Deutsche Forschungsgemeinschaft Review Panel
Priority Programme SPP 1489/2 (Lambrecht, January 29-31) on
Algorithmic and Experimental Methods in Algebra, Geometry and Number Theory.
2017 SIAM Fellow (Society for Industrial and Applied Mathematics)

Other Honors:

- 1997 University of Notre Dame Presidential Award
2009–2013 Member of Advisory Board for the SIAM Activity Group in Algebraic Geometry

Recent Research Support:

- 2015–2016 Notre Dame Office of Research Equipment Restoration and Renewal Program, \$191,052: the ACMS share is \$92,000 (PI A. Sommese; coPIs E. McGinn, J.D. Gezelter, S. Corcelli, Z. Xu). Renewing our In-Silico Labs: Enabling Computationally Based Simulation and Analysis.
Institute for Math. and Its Applications (IMA) Participating Institution (PI) conference proposal: \$1,500 and allowance that PI members may use IMA/PI funds to support personnel’s travel to this conference. (PI J. Hauenstein, with coPIs D. Brake, A. Sommese, and C. Wampler). “Workshop on Software and Applications of Numerical Algebraic Geometry”
NSF DMS 1547743 \$19,020 (PI J. Hauenstein with coPIs D. Brake, A. Sommese, and C. Wampler).
Workshop on Software and Applications of Numerical Algebraic Geometry.
- 2014-2018 NSF ACI-1440607 \$199,847 (PI A. Sommese; coPIs B. Hu and C. Wampler)
SI2-SSE: Collaborative Proposal: Symbolic-Numeric Approaches to Polynomials.
- 2012-2013 DARPA/AFRL Grant G-2457-2: Air Force Office of Scientific Research: Real Numerical Algebraic Geometry: Finding all Real Solutions of a Polynomial System (\$394,583 with CSU [D.J. Bates] lead with Notre Dame PI A. Sommese \$105,688)
- 2011-2012 NSF DMS 1115453 \$20,000 (PI J. Powers with coPI A. Sommese):
Workshop on Verification and Validation in Computational Science;
Fall 2011; Notre Dame, IN
- 2009-2010 NSF DMS 0902504 \$20,000 (PI J. Powers with coPI A. Sommese):
Workshop for Model Reduction in Reactive Flows;
Spring 2009; Notre Dame, IN
- 2007-2011 NSF DMS-0712910 \$359,999 (PI A. Sommese with coPI C. Wampler)
Numerical Algebraic Geometry: Computation of Exceptional Parameter Values.
- 2007-2010 NSF CBET 0650843 \$299,998 (PI J. Powers with coPIs S. Paoluci and A. Sommese)
Slow Invariant Manifolds for Spatially Homogeneous and Inhomogeneous Combustion Systems with Detailed Kinetics
- 2004-2009 NSF DMS 0410047 \$302,729 (PI A. Sommese with coPI C. Wampler)
Collaborative Research : Numerical Algorithms and Software for Solving Polynomial Systems with Parameters.
- 2005-2006 NSF DMS 0509873 \$16,650 (PI S. Tavener with coPIs D. Estep, C. Peterson and A. Sommese)
Workshop on Geometry and Symmetry in Numerical Computation
- 2001-2005 NSF DMS 0105653 \$179,965 (PI A. Sommese)
Collaborative Research : Numerical Algorithms and Software for Decomposing Solution Sets of Polynomial Systems

Research Stays at Mathematics Institutes

- Aug. 1 to Oct. 31, 2013 Colorado State University, Fort Collins
May 15 to June 15, 2011 Mittag-Leffler Institute, Stockholm, Sweden
June 2008 KTH, Stockholm, Sweden
June 2007 University of Milan, Italy
May/June 2007 Eidgenössische Technische Hochschule Zürich (ETH), Switzerland

Mar/Apr 2007	Colorado State University, Fort Collins
Fall 2006	Institute for Mathematics and Its Applications (IMA), Minnesota
July 2004	RiP Program Mathematisches Forschungsinstitut Oberwolfach, Germany
June/July 2001	RiP Program Mathematisches Forschungsinstitut Oberwolfach, Germany
June 2001	University of Bayreuth, Germany
May 2001	University of Milan, Italy
May 2001	University of Genova, Italy
Spring 2000	Mathematical Sciences Research Institute, Berkeley
Fall 1999	Colorado State University, Fort Collins
June 1999	KTH (Royal Institute of Technology), Stockholm, Sweden
June 1998	Max Planck Institut für Mathematik, Bonn, Germany
May 1998	University of Bayreuth, Germany
August 1997	RiP Program Mathematisches Forschungsinstitut Oberwolfach, Germany
July 1997	University of Bayreuth, Germany
June 1996	RiP Program Mathematisches Forschungsinstitut Oberwolfach, Germany
May 96	University of Bayreuth, Germany
June/July 1995	Sonderforschungsbereich 170 Mathematics Institute, University of Göttingen, Germany
June/July 1994	University of Bayreuth, Germany
1992–1993	Max Planck Institut für Mathematik, Bonn, Germany
September 1992	University of Bayreuth, Germany
July 1992	Sonderforschungsbereich 170 Mathematics Institute, University of Göttingen, Germany
October, 1991	University of Bayreuth, Germany
July 1991	Max Planck Institut für Mathematik, Bonn, Germany
August 1988	General Motors Research Laboratories, Warren, Michigan Visiting Consultant
June/July 1988	University of Bayreuth, Germany; Guest Professor
Fall 1987	Max Planck Institut für Mathematik, Bonn, Germany
June 1986	University of Genova, Italy
1984–1985	Max Planck Institut für Mathematik, Bonn, Germany
June 1983	Max Planck Institut für Mathematik, Bonn, Germany
1978–1979	Sonderforschungsbereich Theoretische Mathematik University of Bonn, Germany; Guest Professor
Sept 1978	University of Trento, Italy
July 1977	University of Göttingen, Germany; Guest Professor
1975–1976	Institute for Advanced Study, Princeton, New Jersey

University Committees since 1992

2015	Clare Boothe Luce Committee
2014	Bitcoin Committee
2013	Notebaert Committee
2012–2013	Chair, Committee for the Five-Year Review of the Dean of the College of Science
2012–2013	Multi-disciplinary Research Committee
2009–2013	Advisory Committee for the Center for Research Computing (CRC)
2008–2011	Hesburgh Library Renovation Committee

2008–2010	Member, Director of the Libraries' Five-Year Review Committee
2006–2008	Ad Hoc University Committee on Statistics
2004–2011	University Committee on Libraries Chair for 2007–2008.
2002–2005	Member, College Council of the College of Science
2000–2010	Member, Executive Committee of the Center for Applied Mathematics
2000–2003	Member, University Committee on Intellectual Property
2000–2001	Member of the Graduate Council
1995–1998	Member of the Provost's Advisory Committee
1996	PAC Subcommittee on Tenure and Promotion
1995–1997	Member, Executive Committee of the Academic Council
1995–1997	Chair, Graduate Affairs Committee of the Academic Council
1995	Member, Search Committee for Director of the <i>Kaneb Teaching and Learning Center</i>
1995	Member, Search Committee for Provost
1994–1997	Member of the Academic Council
1994–1995	Member, Search Committee for Assistant Provost for International Studies
1994	Chair of Committee evaluating Internal Review Procedures
1994	Member of the Faculty Senate (ex officio representative from Acad. Council)
1993–1995	Graduate Council
1992	Member of the Review Committee of the EE department

Ph.D. Theses and Fellowship Research completed under A.J. Sommese

- T1 Norman Goldstein, On general manifold sections of submanifolds of homogeneous complex manifolds, Cornell University, August 1979. About 1/2 of this thesis appeared in:
A second Lefschetz theorem for general manifold sections of complex projective space, *Math. Ann.* 246 (1979), 41–68.
- T2 Daniel Gross, On compact categorical quotients by torus actions, University of Notre Dame, June 1982. Results of this thesis appeared in:
Compact quotients by C^* actions, *Pacific J. Math.* 114 (1984), 149–164.
- T3 Harry D Souza, Classification of threefolds whose hyperplane sections are elliptic surfaces, University of Notre Dame, June 1983. Results of this thesis appeared in:
Threefolds whose hyperplane sections are elliptic surfaces, *Pac. J. Math.* 134 (1988), 57–78.
- T4 Elvira L. Livorni, Classification of algebraic surfaces with sectional genus less than or equal to six, University of Notre Dame, August 1983. Results of this thesis appeared in:
Classification of algebraic surfaces with sectional genus less than or equal to six, I : Rational surfaces, *Pacific J. of Math.* 113 (1984), 93–114; II: Ruled surfaces with $\dim \phi_{K_S \otimes L}(S) = 1$, *Canad. Math. J.* 38 (1986); III : Ruled surfaces with $\dim \phi_{K_S \otimes L}(S) = 2$, *Math. Scand.* 59 (1986), 9–29.
Classification of algebraic non-ruled surfaces with sectional genus less than or equal to six, *Nagoya Math. J.* 100 (1985), 1–9.
- T5 Maria L. Fania, Extensions of modifications of ample divisors on fourfolds, University of Notre Dame Thesis, May 1984. Results of this thesis appeared in:
Extensions of modifications of ample divisors on fourfolds, *J. Math. Soc. Japan* 36 (1984), 107–120; II, *J. Math. Soc. Japan* 38 (1986), 285–294.
- T6 Marco Andreatta, spent the 1985/86 academic year on an Italian Government Graduate Fellowship studying hyperplane section theory at the University of Notre Dame. Though he did

not write a Ph.D. Thesis at Notre Dame, results of his work during the year on the problem Sommese gave him are published in:

The stable adjunction mapping, *Math. Ann.* 275 (1986), 305–315.

T7 Jaroslaw A. Wiśniewski, Length of extremal rays and applications, University of Notre Dame, August 1987. Results of this thesis appeared in:

Length of Extremal rays and generalized adjunction, *Math. Z.* 200 (1989), 409–427.

T8 Gian Mario Besana, The geometry of conic bundles arising in adjunction theory, University of Notre Dame, May 1992. Results of this thesis appear in:

On the geometry of conic bundles arising in adjunction theory, *Math. Nachr.* 160 (1993), 223–251.

T9 Shu Nakamura, The classification of the third reductions with a spectral value condition, University of Notre Dame, August 1995. Results of this thesis appeared in:

On the third adjoint contractions, *J. Reine Angew. Math.* 467 (1995), 51–65.

On the classification of the third reductions with a spectral value condition, *J. Math. Soc. Japan* 49 (1997), 633–646.

T10 Mark Andrea De Cataldo, Codimension two subvarieties of quadrics, University of Notre Dame, August 1995. Results of this thesis appear in:

The genus of curves on the three dimensional quadric, *Nagoya Math. J.* 147 (1997), 193–211.

Some adjunction-theoretic properties of codimension two nonsingular subvarieties of quadrics, *Canad. J. Math.* 49 (1997), 675–695.

A finiteness theorem for low-codimensional nonsingular subvarieties of quadrics, *Trans. Amer. Math. Soc.* 349 (1997), 2359–2370.

Codimension two nonsingular subvarieties of quadrics: scrolls and classification in degree $d \leq 10$, *J. Math. Soc. Japan* 50 (1998), 879–902

T11 Sandra Di Rocco, On higher order embeddings of surfaces, University of Notre Dame, May 1996. Results of this thesis appear in:

Projective surfaces with k -very ample line bundles of genus $\leq 3k + 1$, *Manuscr. Math.* 91 (1996), 35–59.

k -very ample line bundles on Del Pezzo surfaces, *Math. Nachr.* 179 (1996), 47–56.

T12 Meeyoung Kim, Barth-Lefschetz type theorem for branched coverings of homogeneous spaces, University of Notre Dame, August 1996. Results of this thesis appear in:

Barth-Lefschetz type theorem for branched coverings of Grassmannians, *J. Reine Angew. Math.* 470 (1996), 109–122.

On branched coverings of Quadrics, *Arch. Math.* 67 (1996), 76–79.

T13 Daniel J. Bates, Theory and applications in numerical algebraic geometry, University of Notre Dame, May 2006. Results of this thesis appear in:

(with E.L. Allgower, A.J. Sommese, and C.W. Wampler), Solution of Polynomial systems derived from differential equations, *Computing*, 76 (2006), 1–10.

(with C. Peterson and A.J. Sommese), A numerical-symbolic algorithm for computing the multiplicity of a component of an algebraic set, *Journal of Complexity* 22 (2006), 475–489.

(with J.D. Hauenstein, A.J. Sommese, and C.W. Wampler), Adaptive multiprecision path tracking, *SIAM Journal on Numerical Analysis* 46 (2008) 722–746.

T14 Ye Lu, Finding all real solutions of polynomial systems, University of Notre Dame, August 2006. Results of this thesis appear in:

(with D.J. Bates, A.J. Sommese, and C.W. Wampler), Finding all real points of a complex curve, *Contemporary Mathematics* 448 (2007), 183–205.

- T15 Jonathan D. Hauenstein, Regeneration, local dimension, and applications in numerical algebraic geometry, University of Notre Dame, May 2009. Results of this thesis appear in:
 (with A.J. Sommese and C.W. Wampler), Regeneration Homotopies for Solving Systems of Polynomials, *Mathematics of Computation*, 80 (2011) 345–377.
 (with D.J. Bates, C. Peterson, and A.J. Sommese), A numerical local dimension test for points on the solution set of a system of polynomial equations, *SIAM Journal on Numerical Analysis*, 47 (2009), 3608–3623.
- T16 Wenrui Hao, Homotopy method for nonlinear partial differential equation systems, University of Notre Dame, August 2013. Results of this thesis appear in several articles including:
 (with J.D. Hauenstein, B. Hu, and A.J. Sommese), A bootstrapping approach for computing multiple solutions of differential equations, *Journal of Computational and Applied Mathematics*, 258 (2014) 181–190.
 (with J.D. Hauenstein, B. Hu, Y. Liu, A.J. Sommese, and Y.-T. Zhang) Continuation along bifurcation branches for a tumor model with a necrotic core, *Journal of Scientific Computing*, 53 (2012), 395–413: available online [dx.doi.org/10.1007/s10915-012-9575-x](https://doi.org/10.1007/s10915-012-9575-x).
 (with J.D. Hauenstein, B. Hu, T. McCoy, and A.J. Sommese), Computing steady-state solutions for a free boundary problem modeling tumor growth by Stokes equation, *Journal of Computational and Applied Mathematics*, 237 (2013), 326–334: available online from Sept. 2012 at [dx.doi.org/10.1016/j.cam.2012.06.001](https://doi.org/10.1016/j.cam.2012.06.001).
 (with J.D. Hauenstein, C.-W. Shu, A.J. Sommese, Z. Xu, Y.-T. Zhang) A homotopy method based on WENO schemes for solving steady state problems of hyperbolic conservation laws, *Journal of Computational Physics*, 250 (2013), 332–346: available online at [dx.doi.org/10.1016/j.jcp.2013.05.008](https://doi.org/10.1016/j.jcp.2013.05.008).
 (with B. Hu and A.J. Sommese) Cell cycle control and bifurcation for a free boundary problem modeling tissue growth, *Journal of Scientific Computing*, 56 (2013), 350–365, online at [dx.doi.org/10.1007/s10915-012-9678-4](https://doi.org/10.1007/s10915-012-9678-4).
- T17 Timothy McCoy, Mesh-expanding homotopies and numerical irreducible decomposition over a number field, University of Notre Dame, August 2014.
- T18 Francesco Pancaldi (Jointly advised with Mark Alber), Mathematical models of bacteria polarity and fibrin network mechanics, University of Notre Dame, August 2017.

Publications

Books and Monographs

- [1] B. Shiffman and A.J. Sommese, *Vanishing theorems on complex manifolds*, Progress in Mathematics, 56 (1985), 170+xiii pages, Birkhäuser, Boston.
- [2] M. Beltrametti and A.J. Sommese, *The adjunction theory of complex projective varieties*, Expositions in Mathematics, 16 (1995), 398+xxi pages, Walter De Gruyter, Berlin. (1995 CHOICE Award for Outstanding Academic Book.)
- [3] M. Beltrametti, M. Schneider, and A.J. Sommese, *Special properties of the adjunction theory for 3-folds in \mathbb{P}^5* , Memoirs of the American Mathematical Society, Number 554 (1995), 63+viii pages, American Mathematical Society, Providence, Rhode Island.
- [4] A.J. Sommese and C.W. Wampler, *Numerical solution of systems of polynomials arising in engineering and science*, (2005), 401+xxii pages, World Scientific Press, Singapore.

- [5] D.J. Bates, J.D. Hauenstein, A.J. Sommese, and C.W. Wampler, *Numerically solving polynomial systems with Bertini*, (2013), SIAM.

Edited Volumes

- [6] A.J. Sommese, A. Biancofiore, and E.L. Livorni (editors), *Algebraic geometry : Proceedings of the international conference held in L'Aquila, Italy, May 30-June 4, 1988*, Lect. Notes in Math. 1417 (1990), 319 pages, Springer Verlag, Berlin & New York.
- [7] C. Ciliberto, E.L. Livorni, and A.J. Sommese (editors), *Classification of algebraic varieties, L'Aquila, Italy, 1992*, Contemporary Math. 162 (1994), 410+xx pages, American Mathematical Society, Providence, R.I.
- [8] A. Dickenstein, F.-O. Schreyer, and A.J. Sommese (editors), *Algorithms in Algebraic Geometry*, volume 146 of *IMA Volumes in Mathematics and Its Applications*, 2007, Springer Verlag.
- [9] G.-M. Greuel, T. Koch, P. Paule, and A.J. Sommese (editors), *Mathematical Software – ICMS 2016*, Lecture Notes in Computer Science, 0725 (2016).

Software

- [10] D.J. Bates, J.D. Hauenstein, A.J. Sommese, and C.W. Wampler. Bertini: Software for Numerical Algebraic Geometry. Available at bertini.nd.edu with permanent doi [dx.doi.org/10.7274/ROH41PB5](https://doi.org/10.7274/ROH41PB5).

Articles

1973

- [11] A.J. Sommese, Algebraic properties of the period mapping, Ph. D. Thesis, Princeton University, June 1973.
- [12] A.J. Sommese, Some algebraic properties of the image of the period mapping, *Rice University Study* (2) 59 (1973), 123–128.
- [13] A.J. Sommese, Borel s fixed point theorem for Kaehler manifolds and an application, *Proc. Amer. Math. Soc.* 41 (1973), 51–54.

1974

- [14] A.J. Sommese, Reversing the Ahlfors estimate, *Proc. A. M. S.* 45 (1974), 242–244.
- [15] A.J. Sommese, Holomorphic vector-fields on compact Kaehler manifolds, *Math. Ann.* 210 (1974), 75–82.

1975

- [16] A.J. Sommese, Criteria for quasi-projectivity, *Math. Ann.* 217 (1975), 107–116.
- [17] A.J. Sommese, Extension theorems for reductive group actions on compact Kaehler manifolds, *Math. Ann.* 218 (1975), 107–116; research notice with same title, *Bull. A.M.S.* 81 (1975), 729–732.
- [18] A.J. Sommese, Quaternionic manifolds, *Math. Ann.* 212 (1975), 191–214.
- [19] A.J. Sommese, A representable functor theorem for compact complex spaces, *Proc. Amer. Math. Soc.* 52 (1975), 11–17.

1976

- [20] A.J. Sommese, Addendum to Criteria for quasi-projectivity, *Math. Ann.* 221 (1976), 95–96.
- [21] A.J. Sommese, On manifolds that cannot be ample divisors, *Math. Ann.* 221 (1976), 55–72.

1977

- [22] A.J. Sommese, On ample divisors, *Proc. Symp. Pure Math.* 30 (1977), 289–292.
- [23] A.J. Sommese, Theorems of Barth-Lefschetz type for homogeneous complex manifolds, *Proc. Nat. Acad. Sci.* 74 (1977), 1332–1333.
- [24] A.J. Sommese, Real algebraic spaces, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. Ser. (4)* 4 (1977), 599–612.
- [25] A.J. Sommese, On the holomorphic jet bundles, *Proc. Symp. Pure Math.* 30 (1977), 49–52.

1978

- [26] A.J. Sommese, On the rationality of the period mapping, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. Ser. (4)* 4 (1978), 683–717.
- [27] A.J. Sommese, Compact complex manifolds possessing a line bundle with a trivial jet bundle, *Abh. Math. Sem. University Hamburg*, 47 (1978), 79–91.
- [28] A.J. Sommese, Submanifolds of Abelian varieties, *Math. Ann.* 233 (1978), 229–256.
- [29] A.J. Sommese, Concavity theorems, *Math. Ann.* 235 (1978), 37–53.
- [30] J. Carrell and A.J. Sommese, C^* actions, *Math. Scand.* 43 (1978), 49–59. [correction to *Math. Scand.* 53 (1983), 32].

1979

- [31] A.J. Sommese, Hyperplane sections of projective surfaces, I: The adjunction mapping, *Duke Math. J.* 46 (1979), 377–401.
- [32] A.J. Sommese, Non-smoothable varieties, *Comment. Math. Helv.* 54 (1979), 140–146.
- [33] A.J. Sommese, Complex subspaces of homogeneous complex manifolds I: Transplanting theorems, *Duke Math. J.* 46 (1979), 527–548.
- [34] J. Carrell and A.J. Sommese, Some topological aspects of C^* actions on compact Kaehler manifolds, *Comment. Math. Helv.* 54 (1979), 567–582.

1981

- [35] A.J. Sommese, Hyperplane sections, *Springer Lect. Notes in Math.* 862 (1981), 232–271.
- [36] A. Howard and A.J. Sommese, On the orders of the automorphism groups of certain projective manifolds, in honor of Yozo Matsushima, ed. by Hano, A. Morimoto, S. Murakami, K. Ozeki, *Progress in Mathematics*, Birkhäuser, 14 (1981), 145–158.

- [37] A.J. Sommese, On the minimality of hyperplane sections of projective threefolds, *J. Reine Angew. Math.* 329 (1981), 16–41.

1982

- [38] A.J. Sommese, Complex subspaces of homogeneous complex manifolds II - Homotopy results, *Nagoya Math. J.* 86 (1982), 101–129.
- [39] A.J. Sommese, Ample divisors on 3-folds, *Algebraic 3-folds (Proceedings Varenna 1981)*, Springer Lect. Notes in Math. 947 (1982), 229–240.

1983

- [40] J. Carrell and A.J. Sommese, $SL(2, C)$ actions on compact Kaehler manifolds, *Trans. Amer. Math. Soc.* 276 (1983), 165–179.
- [41] J. Carrell and A.J. Sommese, A generalization of a theorem of Horrocks, *Proceedings Vancouver 1981*, Springer Lect. Notes in Math. 956 (1983), 23–28.
- [42] J. Carrell and A.J. Sommese, Almost homogeneous C^* actions on compact complex surfaces, *Proceedings Vancouver 1981*, Springer Lect. Notes in Math. 956 (1983), 29–33.
- [43] A.J. Sommese, Some examples of C^* actions, *Proceedings Vancouver 1981*, Springer Lect. Notes in Math. 956 (1983), 118–124.
- [44] A.J. Sommese, A convexity theorem, *Proceedings of Symposia in Pure Math.* 40 (1983), Part 2, 497–505.
- [45] E. Akyldiz, J. Carrell, D. I. Lieberman and A.J. Sommese, On the graded rings associated to holomorphic vector fields with exactly one zero, *Proceedings of Symposia in Pure Math.* 40 (1983), Part 1, 55–56.
- [46] A. Bialynicki-Birula and A.J. Sommese, Quotients by C^* and $SL(2, C)$ actions, *Trans. Amer. Math. Soc.* 279 (1983), 519–543.
- [47] A.J. Sommese, Configurations of -2 rational curves on hyperplane sections of projective threefolds, *Classification of algebraic and analytic manifolds*, edited by K. Ueno, *Progress in Mathematics*, Birkhäuser, 39 (1983), 465–497.
- [48] J. Carrell and A.J. Sommese, Filtrations of meromorphic C^* actions on complex manifolds, *Math. Scand.* 53 (1983), 25–31.
- [49] A. Howard and A.J. Sommese, On the theorem of de Franchis, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. Ser. (4)* 10 (1983), 429–436.

1984

- [50] A.J. Sommese, On the density of ratios of Chern numbers of algebraic surfaces, *Math. Ann.* 268 (1984), 207–221.
- [51] B. Smyth and A.J. Sommese, The degree of the Gauss mapping of submanifolds of Abelian varieties, *Comment. Math. Helv.* 59 (1984), 341–346.

1985

- [52] B. Shiffman and A.J. Sommese, Vanishing theorems for weakly positive vector bundles, Pitman Research Notes 112 (1985), 61–68.
- [53] A. Bialynicki-Birula and A.J. Sommese, Quotients by $C^* \times C^*$ actions, Trans. Amer. Math. Soc. 289 (1985), 519–543.
- [54] J. Lipman and A.J. Sommese, On blowing down projective spaces in singular varieties, J. Reine Angew. Math. 362 (1985), 52–62.
- [55] A.J. Sommese, Ample divisors on normal Gorenstein surfaces, Abh. Math. Sem. University Hamburg 55 (1985), 151–170.

1986

- [56] A.J. Sommese and A. Van de Ven, Homotopy groups of pullbacks of varieties, Nagoya Math. J. 102 (1986), 79–90.
- [57] A.J. Sommese, On the adjunction theoretic structure of projective varieties, in *Proceedings of the Complex analysis and algebraic geometry conference*, ed. by H. Grauert, Göttingen, 1985, Springer Lect. Notes in Math. 1194 (1986), 175–213.
- [58] M. L. Fania and A.J. Sommese, On the minimality of hyperplane sections of Gorenstein threefolds, Contributions to several complex variables, ed. by A. Howard and P.M. Wong, Aspects of Math. E9 (1986), 89–114, Vieweg.
- [59] E. L. Livorni and A.J. Sommese, Threefolds of nonnegative Kodaira dimension with sectional genus less than or equal to 15, Ann. Scuola Norm. Sup. Pisa Cl. Sci. Ser. (4) 13 (1986), 537–558.
- [60] A.J. Sommese, Ample divisors on Gorenstein varieties, Revue de l’Institut E. Cartan, Nancy, 10 (1986) Journal Complexe 1985.
- [61] A. Bialynicki-Birula and A.J. Sommese, A conjecture about compact quotients by tori, Complex Analytic Singularities, ed. by T. Suwa and P. Wagreich, Advanced Stud. in Pure Math. 8 (1986), 59–68, Kinokuniya.

1987

- [62] A. Morgan and A.J. Sommese, A homotopy for solving general polynomial systems that respects m -homogeneous structures, Appl. Math. Comput. 24 (1987), 101–113.
- [63] A. Morgan and A.J. Sommese, Computing all solutions to polynomial systems using homotopy continuation, Appl. Math. Comput. 24 (1987), 115–138; Erratum, 51 (1992), p. 209.
- [64] M. Beltrametti and A.J. Sommese, A criterion for a variety to be a cone, Comment. Math. Helv. 62 (1987), 417–422.
- [65] A.J. Sommese and A. Van de Ven, On the adjunction mapping, Math. Ann. 278 (1987), 593–603.

- [66] M. L. Fania, E. Sato, and A.J. Sommese, On the structure of fourfolds with a hyperplane section which is a P^1 bundles over a surface that fibres over a curve, Nagoya Math. J. 108 (1987), 1–14.

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Book Reviews

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Colloquia, Conference, and Major Workshop Talks since 1979

- 2019 Classical Algebraic Geometry in Milano.
University of Milan, Italy, July 11.
Title: Real Critical Sets of Cyclotomic Polynomials.
- 2018 Seminar Talk at Penn State, October 28, 2018.
Title: A survey of Numerical Algebraic Geometry with Applications.
International Symposium on Symbolic and Algebraic Computation (ISSAC), New York
CUNY Graduate Center and Courant Institute, July 18.
Title: Polynomial Systems Arising From Discretizing Systems of
Nonlinear Differential Equations.
Classical Algebraic Geometry and related topics, Genoa.
University of Genoa, Italy, July 2.
Title: Polynomial Systems Arising From Discretizing Systems of
Nonlinear Differential Equations.
- 2015 Algebraic Geometry, Warsaw 1960 - 2015
University of Warsaw, Poland, March 20.
Title: Numerical Algebraic Geometry.
- 2014 University of Illinois at Urbana-Champaign
Algebraic Geometry Seminar (Mathematics Department), November 13.
Title: Numerical Algebraic Geometry: Theory and Practice.
International Conference on Mathematical Software (ICMS 2014)
Hanyang University, Seoul, Korea, August 8.
Plenary Lecture: Numerical Algebraic Geometry: Theory and Practice.
MIDA Group Seminar, University of Genoa, Italy, April 28
Title: Numerical algebraic geometry over number fields.
Joint Mathematics Meetings, Baltimore, MD.
Session on Nonlinear Systems, January 16.
Title: Numerical algebraic geometry over number fields.
- 2013 SIAM Conference on Applied Algebraic Geometry, CSU, Fort Collins, CO.
Session on Algorithms in Numerical Algebraic Geometry, August 2.
Title: Polynomial systems and algebraic number fields.
North Carolina State University
Numerical Analysis Seminar (Mathematics Department), April 2.
Title: Numerical algebraic geometry and differential equations.
- 2012 SAGA III Workshop
Fondazione GraphiTech, University of Trento, Italy, Oct. 9-11.

- Plenary Lecture: Numerical algebraic geometry and differential equations.
 Department of Mathematics, University of Genova, Italy, June 6
 Colloquium Title: Numerical Algebraic Geometry and Solution
 of Systems of Nonlinear Differential Equations.
- 2011 Special Session: Applications of Numerical Algebraic Geometry
 SIAM Conference on Applied Algebraic geometry, Raleigh, NC, October 7
 Title: Tumor Growth Models and Numerical Algebraic Geometry.
 Mittag-Leffler Institute, Stockholm, May 17.
 Title: Numerical algebraic geometry and differential equations.
 AMS-SIAM Special Session on Applications of Algebraic Geometry, I
 Joint Mathematics Meeting, San Francisco, CA, January 16
 Title: Zebra Fish, Tumor Growth, and Algebraic Geometry.
- 2010 New geometric and numeric tools for the analysis of differential equations
 Banff International Research Station, Canada, August 13-15.
 Title: Zebra Fish, Tumor Growth, and Algebraic Geometry.
 Midwest Algebra, Geometry and Their Interactions Conference (MAGIC'10)
 University of Notre Dame, Indiana, April 23-25.
 Title: Recent Work in Numerical Algebraic Geometry.
 Workshop on Randomization, Relaxation, and Complexity
 Banff International Research Station, Canada, March 4
 Title: Recent Results in Numerical Algebraic Geometry.
 Fraunhofer Institute ITWM, Kaiserslautern, Germany, February 11
 Title: Four-bars, Zebra Fish, and Tumor Growth.
 AMS-SIAM Special Session on Applications of Algebraic Geometry, I
 Joint Mathematics Meeting, San Francisco, CA, January 16
 Title: Zebra Fish, Tumor Growth, and Algebraic Geometry.
- 2009 Workshop on Complexity of Numerical Computation
 Fields Institute, Toronto, October 21
 Title: Zebra Fish, Tumor Growth, and Algebraic Geometry.
 Department of Mathematics
 Western Michigan University, October 1
 Colloquium Title: Zebra Fish, Tumor Growth, and Algebraic Geometry.
 Projective Algebraic Geometry in Milano
 University of Milan, Italy, June 11-12
 Title: Zebra Fish, Cancer, and Algebraic Geometry.
 Joint Mathematics Meeting, Washington, D.C., January 7
 AMS Special Session on Computational Algebra and Convexity
 Title: A Numerical Local Dimension Test for Algebraic Sets
- 2008 ApCoA 2008: Workshop on Approximate Commutative Algebra
 Research Institute for Symbolic Computation (RISC)
 Hagenberg-Linz, Austria, July 24–26
 Title: Recent Results in Numerical Algebraic Geometry.
 Department of Mathematics, KTH, Stockholm, Sweden, June 11
 Colloquium Title: A Brief Introduction to Numerical Algebraic Geometry.
- 2007 Electrical and Computer Engineering Department
 North Carolina State University, Raleigh, October 19
 Title: Numerical Algebraic Geometry.
 De Paul University, Chicago, October 5
 American Mathematical Society Sectional Meeting

- Numerical and Symbolic Techniques in Algebraic Geometry and Its Applications
 Title: Recent Results in Numerical Algebraic Geometry.
 Mathematics Department, University of California at Berkeley, October 2
 Commutative Algebra and Algebraic Geometry Seminar
 Title: Recent Results in Numerical Algebraic Geometry.
 Mathematics Department, University of Western Ontario, Canada, July 24
 Title: Numerical Algebraic Geometry.
 Projective Geometry and Commutative Algebra in Applications
 Department of Mathematics, University of Genova, Italy, June 15–16
 Title: Recent Results in Numerical Algebraic Geometry
 University of Zurich, Switzerland, June 11
 Oberseminar: Algebraische Geometrie
 Title: A Survey of Numerical Algebraic Geometry
 Algebraic Geometry in Higher Dimensions, Levico Terme, Trento, Italy, June 3–9
 Title: Recent Progress in Numerical Algebraic Geometry.
 University of Zurich, Switzerland, May 23
 Arbeitsgemeinschaft in Codierungstheorie und Kryptographie
 Title: Numerical Algebraic Geometry: using numerical analysis
 to do algebraic geometry computations
 Mathematics Department, Colorado State University, Fort Collins, April 17
 Algebra Seminar: An introduction to numeric algebraic geometry
 Department of Mathematics, University of Connecticut at Storrs, March 15
 Colloquium Title: Overview of Numerical Algebraic Geometry.
 Air Force Office of Scientific Research/National Science Foundation Conference
 New Directions in Complex Data Analysis for Emerging Applications,
 Breckenridge, Colorado, March 4–7.
 Talk Title: Numerical Algebraic Geometry.
- 2006 School of Mathematics, University of Minnesota, October 6
 Colloquium Title: Computing the Genus of a Curve Numerically.
 Algebraic geometry and applications seminar,
 Institute for Mathematics and Its Applications IMA,
 University of Minnesota, September 13
 Talk Title: Solving Polynomial Systems by Homotopy Continuation.
 Komplexe Analysis, Oberwolfach, Germany, August 31
 Talk Title: Exceptional Sets and Fiber Products
 Satellite Conference on Algebraic Geometry
 Segovia, Spain, August 16–19, 2006
 Plenary Lecture: Numerical Algebraic Geometry.
 Mathematics Roundtable (together with Parker Ladwig)
 of the Physics-Astronomy-Mathematics Division,
 Special Libraries Association Meeting, Baltimore, Maryland, June 13
 Topic presented and discussed: Half-life of Journal Citations.
 Approximate Commutative Algebra,
 Johann Radon Institute for Computational and Applied Mathematics,
 Linz, Austria, February 20–24, 2006
 Keynote Address: Adaptive Multiprecision and Numerical Algebraic Geometry.
 Computer Science Department, University of Utah, Salt Lake City, January 31
 Colloquium Title: Adaptive Multiprecision and
 Efficient Numerical Solution of Polynomial Systems.

- Special Session on Symbolic-Numeric Computation and Applications,
 American Mathematical Society Meeting, San Antonio, Texas, January 16
 Talk Title: Exceptional Sets and Fiber Products.
- 2005 Challenges in Linear and Polynomial Algebra in Symbolic Computation
 Software, Banff International Research Station, Canada,
 October 1–6, 2005
- Workshop on geometry and symmetry in numerical computation, in honor
 of Eugene Allgower, Colorado State University, August 8-10, 2005
- Symposium on Dynamical System and Numerical Analysis, in honor of
 Tien-Yien Li, Hsinchu, Taiwan, May 10-12, 2005
- 2004 Fall AMS Central Section Meeting, Northwestern University
 Special Session on “Solving Polynomial Systems”
 Komplexe Analysis, Oberwolfach, Germany
 Universität des Saarlandes, Saarbrücken, Germany
 Asymptotic and Effective Results in Complex Geometry,
 Johns Hopkins Univ.
- 2003 University of Minnesota, Minneapolis
- 2002 Presentation of the Milan Journal of Mathematics and
 Its Editorial Board, Milan, Italy
- Applied Mathematics Seminar, University of Illinois at Chicago
 Foundations of Computational Mathematics
 Institute for Mathematics and Its Applications, Minneapolis
- 2001 Conference in Honor of Alan Huckleberry, Bochum, Germany
 NATO Advance Research Workshop: Application of Algebraic Geometry
 to Coding Theory, Physics, and Computation, Eilat, Israel
 University of Bayreuth, Germany
 University of Milan, Italy
 University of Genova, Italy
 The Johns Hopkins University, Baltimore, Maryland
- 2000 Komplexe Analysis, Oberwolfach, Germany
 (Clay Mathematics Institute Emissary to the Conference)
 AMS-IMS-SIAM Conference on Algorithms, Computational Complexity, and
 Models of Computation for Nonlinear and Multivariate Problems,
 Mount Holyoke College, South Hadley, Massachusetts
 University of California at Riverside, California
 Michigan State University, Lansing, Michigan
 University of British Columbia, Vancouver, Canada
- 1999 Foundations of Computational Mathematics 99, Oxford University, England
 Colorado State University, Fort Collins, Colorado
 K.T.H. (Royal Institute of Technology), Stockholm, Sweden
- 1998 Conference in honor of Michael Schneider, University of Bayreuth, Germany
 Hirzebruch 70 Conference, University of Warsaw, Poland
 University of Bayreuth, Germany
- 1997 University of Milan, Italy (four talks)
 University of Genova, Italy
 University of Bayreuth, Germany
- 1996 Washington University, St. Louis, Missouri
 University of Leiden, The Netherlands
 University of Bayreuth, Germany (two talks)

- Mathematical Sciences Research Institute, Berkeley, California
 Japan–U.S.A. Conference on Algebraic Geometry
 The Johns Hopkins University, Baltimore, Maryland
- 1995 Oklahoma State University, Stillwater, Oklahoma (2 talks)
 AMS-SIAM Summer Seminar on Numerical Analysis, Park City, Utah
 University of Göttingen
- 1994 University of Bayreuth, Germany
 Complex Geometry, Trento, Italy
- 1993 Max-Planck-Institut für Mathematik, Bonn, Germany (2 talks)
 Complex Algebraic Geometry, Bayreuth, Germany
 Hirzebruch 65 Conference at Bar Ilan University, Tel Aviv, Israel
 University of Trento, Italy (2 talks)
 University of Illinois at Chicago
- 1992 University of Bayreuth, Germany
 University of Göttingen, Germany
- 1991 University of Bayreuth, Germany
 Max Planck Institute for Mathematics, Bonn, Germany (2 talks)
 Projective Classification of Varieties, Oberwolfach, Germany
 U.S.-Japan Complex Algebraic Geometry Conference
 The Johns Hopkins University, Baltimore, Maryland
- 1990 University of L’Aquila, Italy (4 talks)
 Geometry of Complex Algebraic Varieties, Cetraro, Italy
 Complex Algebraic Varieties, University of Bayreuth, Germany
- 1989 University of Milan, Italy (3 talks)
 University of Genova, Italy
 University of Missouri at Columbia, Missouri
 Vector Bundles and Special Projective Embeddings, Bergen, Norway
 Midwest Algebraic Geometry Conference, Ann Arbor, Michigan
- 1988 University of Bayreuth, Germany
 Yale University
 University of Albuquerque, New Mexico (2 talks)
 Hyperplane Sections and Related Topics, L’Aquila, Italy
 (Principal Speaker–4 talks)
 Complex Geometry VII, Trento, Italy
- 1987 University of L’Aquila, Italy (2 talks)
 University of Genova, Italy (2 talks)
 University of Milan, Italy (2 talks)
 University of Essen
 University of Göttingen
 University of Heidelberg
 Max Planck Institute for Mathematik, Bonn, Germany
 Complex Geometry VI, Trento, Italy
 Algebraic Geometry, Columbia University, New York, N.Y.
- 1986 General Motors Research Laboratories, Warren, Michigan
 University of Regina, Regina, Saskatchewan, Canada
 University of Munich, Germany
 University of Bayreuth, Germany
 University of Genova, Italy, (six lectures)
 University of Milan, Italy (2 talks)

- Singularities, University of Iowa City, Iowa
 Complex Geometry V, Trento, Italy
- 1985 Complex Analysis and Algebraic Geometry,
 Math. Inst., Göttingen, Germany
 Complex Geometry, University of Nancy I, Nancy, France
 AMS, Regional Meeting, Columbia, Missouri (Principal Speaker)
- 1984 Tokyo Metropolitan University
 University of Bonn, Germany
 Max Planck Institute for Mathematics, Bonn, Germany
 University of Leiden, The Netherlands
 University of Essen, Germany
 University of Hamburg, Germany
 Complex Geometry V, Trento, Italy
 Joint USA/Japan Complex Singularities Conference,
 Tsukuba, Ibaraki, Japan
 Complex Singularities, Research Inst. for Math, Science, Kyoto, Japan
 Complex Geometry III, Trento, Italy
 Algebraic Geometry, Lake Wigry, Poland, (Principal Speaker–7 lectures)
 Complex Analysis, Oberwolfach, Germany
- 1983 USA-France Conference on Singularities, Ecole Poly., Paris, France
 Purdue University
- 1982 Algebraic Group Actions on Algebraic Varieties, Nowy Sacz, Poland
 Classification of Algebraic and Analytic Manifolds
 Taniguchi Foundation Conference, Katata, Japan
 Algebraic Geometry, Kobe, Japan
 AMS Symposium on Several Complex Variables,
 University of Wisconsin, Madison
 The Johns Hopkins University
 University of Osaka, Japan
 University of Tokyo, Japan
 University of Hokkaido at Sapporo, Japan
 University of Warsaw, Poland
- 1981 Threefolds Conference, Varenna, Italy
 G_m Action Conference, Univ. of British Columbia
 AMS Symposium on Singularities, Humboldt Univ., Arcata, California
 University of Washington, Seattle
 University of Kentucky
 University of British Columbia, Vancouver, B.C.
- 1980 University of Washington, Seattle
 University of Michigan, Ann Arbor
 Midwest Algebraic Geometry Conference, Univ. of Illinois at Chicago
 Pacific Northwest Geometry Conference, Univ. of Washington, Seattle
- 1979 University of Kaiserslautern
 University of Bonn
 University of Notre Dame
 University of Regensburg
 Invariant Theory, Oberwolfach, Germany

Meetings attended by Invitation since 1979 (with no talk given)

2008 Interactions of Classical & Numerical Algebraic Geometry
University of Notre Dame, Indiana

2004 Workshop on Some New Mathematical Opportunities at DARPA
Classical Algebraic Geometry, Oberwolfach, Germany

Professional Society Affiliations Society for Industrial and Applied Mathematics, American Mathematical Society.

Other Affiliations: Member of Phi Beta Kappa, American Friends of the Alexander von Humboldt Foundation.

Research Specialities Numerical Algebraic Geometry (Numerical Analysis of Polynomial Systems), Numerical Partial Differential Equations, Complex Algebraic Geometry.

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