

References

1. M. Abate, *The residual index and the dynamics of holomorphic maps tangent to the identity*, Duke Math. J. **107** (2001) 173–207.
2. M. Abate, F. Bracci and F. Tovena, *Index theorems for holomorphic self-maps*, Ann. of Math. **159** (2004) 819–864.
3. M. Abate, F. Bracci and F. Tovena, *Index theorems for holomorphic maps and foliations*, math.CV/0601602
4. R. Abraham and J. Robin, *Transversal mappings and flows*, W.A. Benjamin, Inc., 1967.
5. N. A'Campo, *Structures de pseudovariété sur les espaces analytiques complexes*, in Intersection Homology, A. Borel et al. Progress in Mathematics, Vol. 50, Birkhäuser, Boston, Inc. 1984, 41–45.
6. M. Aguilar, J. Seade and A. Verjovsky, *Indices of vector fields and topological invariants of real analytic singularities*, Crelle's, J. Reine u. Ange. Math. **504** (1998), 159–176.
7. Aleksandrov, A.G. The index of vector fields and logarithmic differential forms. Funct. Anal. Appl. 39, No. 4, 245–255 (2005).
8. P. Aluffi, *Chern classes for singular hypersurfaces*, Trans. Amer. Math. Soc. **351** (1999), 3989–4026.
9. V. I. Arnold, *Index of a singular point of a vector field, the Petrovskii-Oleinik inequality and Mixed Hodge structures*, Funct. Anal. Appl. **12** (1978), 1–14.
10. V. I. Arnold, S. M. Gusein-Zade and A. N. Varchenko, *Singularities of Differentiable Maps, Volume I*, Birkhäuser, 1985 (Translated from Russian).
11. M. Atiyah and F. Hirzebruch, *Analytic cycles on complex manifolds*, Topology, **1** (1961), 25–45.
12. M. Atiyah and F. Hirzebruch, *The Riemann-Roch for analytic embeddings*, Topology **1** (1962), 151–166.
13. P. Baum and R. Bott, *On the zeroes of meromorphic vector-fields*, Essays on Topology and Related Topics, Springer-Verlag, New York, Heidelberg, Berlin, 29–47, 1970.
14. P. Baum and R. Bott, *Singularities of holomorphic foliations* J. Differential Geom. **7** (1972), 279–342.
15. P. Baum, W. Fulton and R. MacPherson, *Riemann-Roch for singular varieties*, Publ. Math. IHES **45** (1975), 101–145.
16. Ch. Bonatti and X. Gómez-Mont, *The index of a holomorphic vector field on a singular variety*, Astérisque 222 (1994), 9–35.
17. H.-C. Graf von Bothmer, W. Ebeling and X. Gómez-Mont, *An algebraic formula for the index of a vector field on an isolated complete intersection singularity*, Ann. Inst. Fourier (Grenoble) 58 (2008), no. 5, 1761–1783.
18. R. Bott, *The stable homotopy of the classical groups*, Proc. Nat. Acad. Sci. **13** (1957), 933–935.

19. R. Bott, *Lectures on characteristic classes and foliations*, in “Lectures on Algebraic and Differential Topology”, Lecture Notes in Mathematics **279** Springer-Verlag 1972, 1–94.
20. R. Bott and L. Tu, *Differential Forms in Algebraic Topology*, Graduate Texts in Mathematics 82, Springer-Verlag, New York, Heidelberg, Berlin, 1982.
21. F. Bracci, *The dynamics of holomorphic maps near curves of fixed points*, Ann. Sc. Norm. Super. Pisa Cl. Sci. **2** (2003), 493–520.
22. F. Bracci and T. Suwa, *Residues for singular pairs and dynamics of biholomorphic maps of singular surfaces*, Intern. J. Math. **15** (2004), 443–466.
23. F. Bracci and T. Suwa, *Residues for holomorphic foliations of singular pairs*, Advances in Geom. **5** (2005), 81–95.
24. F. Bracci and F. Tovena, *Residual indices of holomorphic maps relative to singular curves of fixed points on surfaces*, Math. Z. **242** (2002), 481–490.
25. J.-P. Brasselet, *Définition combinatoire des homomorphismes de Poincaré, Alexander et Thom pour une pseudo-variété* in “Caractéristique d’Euler-Poincaré”, Astérisque 82-83, Société Mathématique de France (1981), 71–91.
26. J.-P. Brasselet, *Existence des classes de Chern en théorie bivariante*, Astérisque 101-102 (1983), 7–22.
27. J.-P. Brasselet, *Local Euler obstruction, old and new*, in “Proceedings of XI Brazilian Topology Meeting (Rio Claro, 1998)”, World Sci. Publishing, River Edge, NJ (2000), 140–147.
28. J.-P. Brasselet, *Characteristic Classes of Singular Varieties*, book in preparation.
29. J.-P. Brasselet, D. T. Lê and J. Seade, *Euler obstruction and indices of vector fields*, Topology 39 (2000), 1193–1208.
30. J.-P. Brasselet, D. Lehmann, J. Seade and T. Suwa, *Milnor numbers and classes of local complete intersections*, Proc. Japan Acad. Ser. A Math. Sci 75 (1999), 179–183.
31. J.-P. Brasselet, D. Lehmann, J. Seade and T. Suwa, *Milnor classes of local complete intersections*, Transactions A. M. S. **354** (2001), 1351–1371.
32. J.-P. Brasselet, D. Massey, A. J. Parameswaran and J. Seade, *Euler obstruction and defects of functions on singular varieties*, J. London Math. Soc. 70 (2004), 59–76.
33. J.-P. Brasselet et M.-H. Schwartz, *Sur les classes de Chern d’un ensemble analytique complexe*, Astérisque **82-83** (1981), 93–147.
34. J.-P. Brasselet, J. Seade and T. Suwa, *An explicit cycle representing the Fulton-Johnson class*, in “Singularités Franco-Japonaises”, Sémin. Congr., 10, Soc. Math. France, Paris, p. 21–38, 2005.
35. J.-P. Brasselet, J. Seade and T. Suwa, *A proof of the proportionality theorem*, Preprint 2005.
36. J.-P. Brasselet, J. Seade and T. Suwa, *Proportionality of Indices of 1-Forms on Singular Varieties*, in “Singularities in geometry and topology 2004”, ed. J.-P. Brasselet et al., Proceedings of the 3rd Franco-Japanese colloquium on singularities, Hokkaido, Japan. Advanced Studies in Pure Mathematics 46, 49–65 (2007).
37. J. Briançon, P. Maisonobe et M. Merle, *Localisation de systèmes différentiels, stratifications de Whitney et condition de Thom*, Invent. Math. **117** (1994), 531–550.
38. J. Bruce and R. Roberts, *Critical points of functions on analytic varieties*, Topology **27** (1988), 57–90.
39. M. Brunella, *Feuilletages holomorphes sur les surfaces complexes compactes*, Ann. Sci. E.N.S **30** (1997), 569–594.
40. M. Brunella, *Some remarks on indices of holomorphic vector fields*, Publicacions Matemàtiques **41** (1997), 527–544.
41. R.-O. Buchweitz and G.-M. Greuel, *The Milnor number and deformations of complex curve singularities*, Invent. Math. **58** (1980), 241–281.

42. C. Camacho and P. Sad, *Invariant varieties through singularities of holomorphic vector fields*, Ann. of Math. **115** (1982), 579–595.
43. V. Castellanos, *The index of non-algebraically isolated singularities*, Bol. Soc. Mat. Mex. **8** (2002), 141–148.
44. S.S. Chern, *Characteristic classes of Hermitian Manifolds*, Ann. of Math. **47** (1946), 85–121.
45. A. Dimca, *Singularities and Topology of Hypersurfaces*, Springer-Verlag, 1992.
46. A. Dubson, *Classes caractéristiques des variétés singulières*, C.R. Acad.Sc. Paris **287** (1978), no. 4, 237–240.
47. A. Dubson, *Formule pour l'indice des complexes constructibles et des D-modules holonomes*, C. R. Acad. Sci. Paris Sér. I Math. **298** (1984), no. 6, 113–116.
48. A. du Plessis, *Continuous controlled vector fields*, Singularity theory (Liverpool, 1996), London Math. Soc. Lecture Note Ser., 263, Cambridge Univ. Press, Cambridge, 1999, 189–197.
49. W. Ebeling and S. Gusein-Zade, *On the index of a vector field at an isolated singularity*, The Arnoldfest (Toronto, ON, 1997), 141–152, Fields Inst. Commun., 24, Amer. Math. Soc., Providence, RI, 1999.
50. W. Ebeling and S. Gusein-Zade, *On the index of a holomorphic 1-form on an isolated complete intersection singularity*, (Russian) Dokl. Akad. Nauk **380** (2001), no. 4, 458–461.
51. W. Ebeling and S. Gusein-Zade, *Indices of 1-forms on an isolated complete intersection singularity*, Dedicated to Vladimir I. Arnold on the occasion of his 65th birthday. Mosc. Math. J. **3** (2003), no. 2, 439–455, 742–743.
52. W. Ebeling and S. Gusein-Zade, *Radial index and Euler obstruction of a 1-form on a singular variety*, Geom. Dedicata **113** (2005), 231–241.
53. W. Ebeling and S. Gusein-Zade, *Indices of vector fields or 1-forms and characteristic numbers*. Bull. London. Math. Soc. **37** (2005), 747–754.
54. W. Ebeling and S. Gusein-Zade, *Indices of vector fields and 1-forms on singular varieties*, In Global aspects of complex geometry, P. 129–169. Springer-Verlag 2006, Ed. F. Cattanesi, H. Esnault and al.
55. W. Ebeling and S. Gusein-Zade, *Indices of collections of 1-forms*. Singularities in geometry and topology, 629–639, World Sci. Publ., Hackensack, NJ, 2007. Ed. J.-P. Brasselet et al.,
56. W. Ebeling and S. Gusein-Zade, *Chern obstructions for collections of 1-forms on singular varieties*. In “Singularity theory”; Proceedings of the 2005 Marseille singularity school and conference, CIRM, Marseille, France. Ed. D. Chéniot et al., World Scientific. 557–564 (2007).
57. W. Ebeling, S. Gusein-Zade and J. Seade, *Homological index for 1-forms and a Milnor number for isolated singularities*, International J. Math. **15** (2004), 895–905.
58. D. Eisenbud and H. Levine, *An algebraic formula for the degree of a C^∞ map germ*, Ann. Math. (2) **106** (1977), no. 1, 19–44.
59. W. Fulton, *Intersection Theory*, Springer-Verlag (1984).
60. W. Fulton and K. Johnson, *Canonical classes on singular varieties*, Manuscripta Math. **32** (1980), 381–389.
61. W. Fulton and R. MacPherson, *Categorical Framework for the study of singular Spaces*, Memoirs of Amer. Math. Soc. **243** (1981).
62. L. Giraldo, X. Gómez-Mont and P. Mardešić, *Computation of topological numbers via linear algebra: hypersurfaces, vector fields and vector fields on hypersurfaces*, Complex geometry of groups (Olmu, 1998), 175–182, Contemp. Math., 240, Amer. Math. Soc., Providence, RI, 1999.
63. L. Giraldo, X. Gómez-Mont and P. Mardešić, *On the complex formed by contracting differential forms with a vector field on a hypersurface singularity*, Bol. Soc. Mat. Mexicana (3) **7** (2001), no. 2, 211–221.

64. L. Giraldo, X. Gómez-Mont and P. Mardešić, *A law of conservation of number for local Euler characteristics*, Complex manifolds and hyperbolic geometry (Guanajuato, 2001), 251–259, Contemp. Math., 311, Amer. Math. Soc., Providence, RI, 2002.
65. L. Giraldo, X. Gómez-Mont and P. Mardešić, *On the index of vector fields tangent to hypersurfaces with non-isolated singularities*, J. London Math. Soc. (2) **65** (2002).
66. L. Giraldo, X. Gómez-Mont and P. Mardešić, *Flags in zero dimensional complete intersections and indices of real vector fields*, Preprint 2008, arXiv:math/0612275.
67. B. Gmira, *Sur les feuilletages holomorphes singuliers de codimension 1*, Publications Mathématiques, 1992, 36 (1): 229–240,
68. X. Gómez-Mont, *An algebraic formula for the index of a vector field on a hypersurface with an isolated singularity*, J. Algebraic Geom. **7** (1998), 731–752.
69. X. Gómez-Mont and P. Mardešić, *The index of a vector field tangent to a hypersurface and signature of the relative Jacobian determinant*, Ann. Inst. Fourier (Grenoble) **47** (1997), 1523–1539.
70. X. Gómez-Mont and P. Mardešić, *The index of a vector field tangent to an odd-dimensional hypersurface, and the signature of the relative Hessian*, Funct. Anal. Appl. **33** (1999), no. 1, 1–10.
71. X. Gómez-Mont, J. Seade and A. Verjovsky, *The index of a holomorphic flow with an isolated singularity*, Math. Ann. **291** (1991), 737–751.
72. G. Gonzalez-Sprinberg, *L'obstruction locale d'Euler et le théorème de MacPherson*, Astérisque **82-83** (1981), 7–32.
73. M. Goresky and R. MacPherson, *Stratified Morse theory*, Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge, Bd. 14. Berlin Springer-Verlag 1988.
74. G.-M. Greuel, *Der Gauß-Manin-Zusammenhang isolierter Singularitäten von vollständigen Durchschnitten*, Math. Ann. **214** (1975), 235–266.
75. Ph. Griffiths and J. Harris, *Principles of Algebraic Geometry*, John Wiley and Sons, 1978.
76. N. de Góes Grulha Júnior, *L'obstruction d'Euler locale d'une application*, Ann. Fac. Sci. Toulouse Math. (6) **17** (2008), no. 1, 53–71.
77. N. de Góes Grulha Júnior, *The Euler obstruction and Bruce Roberts' Milnor Number*, The Quarterly Journal of Mathematics, 2009, 60(3), 291–302.
78. S. Gusein-Zade, *The index of a singular point of a gradient vector field*, Funct. Anal. and Appl. **18** (1984), 6–10.
79. H. Hamm, *Lokale topologische Eigenschaften komplexer Räume*, Math. Ann. **191** (1971), 235–252.
80. R. Harvey and H.B. Lawson *A theory of characteristic currents associated with a singular connection*, Astérisque **213**, Société Mathématique de France, 1993.
81. J.-P. Henry, M. Merle et C. Sabbah, *Sur la condition de Thom stricte pour un morphisme analytique complexe*, Ann. Sci. E. N. S. **17** (1984), 227–268.
82. H. Hironaka, *Stratification and flatness*, in “Real and Complex singularities”, Proceedings of the Nordic Summer School, Oslo 1976; edited by P. Holm; Publ. Sijthoff & Noordhoff Int. Publishers (1977), 199–265.
83. M. Hirsch, *Smooth regular neighborhoods*, Ann. of Math. **76** (1962), 524–530.
84. F. Hirzebruch, *Topological Methods in Algebraic Geometry*, Springer-Verlag, 1966.
85. H. Hopf, *Über die Curvatura integra geschlossener Hyperflächen*, Math. Ann. **95** (1925), 340–367.
86. B. Iversen, *Local Chern classes*, Ann. Scient. Éc. Norm. Sup. **9** (1976), 155–169.
87. T. Izawa and T. Suwa, *Multiplicity of functions on singular varieties*, Internat. J. Math. **14**, 5 (2003), 541–558.
88. M. Kato, *Singularities and some global topological properties*, Proc. R.I.M.S. Singularities Symposium, Kyoto University 1978.

89. M. Kervaire, *Courbure intégrale généralisée et homotopie*, Math. Ann. **131** (1956), 219–252.
90. M. Kervaire, *An interpretation of G. Whitehead's generalization of H. Hopf's invariant*, Ann. Math. **69** (1959), 345–365.
91. M. Kervaire and J. Milnor, *Groups of homotopy spheres I*, Ann. of Maths. **77** (1963), 504–537.
92. B. Khanedani, *On homological index*, Ann. Fac. Sci. Toulouse, Math, **9** (2000), 433–450.
93. B. Khanedani and T. Suwa, *First variation of holomorphic forms and some applications*, Hokkaido Math. J. **26** (1997), 323–335.
94. G.N. Khimshiashvili, *On the local degree of a smooth mapping*, Comm. Acad. Sci. Georgian SSR **85**, No. 2 (1977), 309–312 (in Russian).
95. A.G. Khovanskii, *Index of a polynomial field*, Funct. Anal. Appl. **13**, 38–45 (1979).
96. H. King and D. Trotman, *Poincaré–Hopf theorems on stratified sets*, preprint 1996.
97. O. Klehn, *On the index of a vector field tangent to a hypersurface with non-isolated zero in the embedding space*, Math. Nachr. **260** (2003), 48–57.
98. O. Klehn, *Real and complex indices of vector fields on complete intersection curves with isolated singularity*, Compos. Math. **141** (2005), no. 2, 525–540.
99. K. Kodaira, *On compact complex analytic surfaces, I*, Ann. of Math. **71** (1960), 111–152.
100. M. Kwieciński, *Sur le transformé de Nash et la construction du graphe de MacPherson*, Thèse, Univ. de Provence, 1994.
101. D.T. Lê, *Computation of the Milnor number of an isolated singularity of a complete intersection*, Funct. Anal. Appl. **8** (1974), 45–49.
102. D. T. Lê, *Some remarks on the relative monodromy*, Real and Complex Singularities Oslo 1976, Sijhoff en Nordhoff, Alphen a.d. Rijn 1977, pp. 397–403.
103. D. T. Lê, *Le concept de singularité isolée de fonction analytique*, Adv. Stud. Pure Math. **8** (1986), 215–227, North Holland.
104. D. T. Lê, *Singularités isolées des intersections complètes*, in “Introduction à la théorie des singularités”, Travaux en cours **36**, Hermann (1988).
105. D. T. Lê, *Polyèdres évanescents et effondrements*, in “A fete of Topology”, edited by Y. Matsumoto, T. Mizutani, S. Morita; Academic Press, 1988, 293–329.
106. D. T. Lê et B. Teissier, *Variétés polaires locales et classes de Chern des variétés singulières*, Ann. of Math **114** (1981), 457–491.
107. D. T. Lê et B. Teissier, *Cycles évanescents et conditions de Whitney*, in Proc. Symp. Pure Math **40**, Part 2 (1983), 65–103.
108. D. Lehmann, *Variétés stratifiées C^∞ : Intégration de Čech-de Rham et théorie de Chern–Weil*, in “Geometry and Topology of Submanifolds II”, Proc. Conf., May 30–June 3, 1988, Avignon, France, Publ. World Scientific (1990), 205–248.
109. D. Lehmann, *Systèmes d'alvéoles et intégration sur le complexe de Čech-de Rham*, Publications de l'IRMA, **23**, N° VI, Université de Lille I, 1991.
110. D. Lehmann, *Résidus des sous-variétés invariantes d'un feuilletage singulier*, Ann. Inst. Fourier **41** (1991), 211–258.
111. D. Lehmann, M. Soares and T. Suwa, *On the index of a holomorphic vector field tangent to a singular variety*, Bol. Soc. Bras. Mat. **26** (1995), pp. 183–199.
112. D. Lehmann and T. Suwa, *Residues of holomorphic vector fields relative to singular invariant subvarieties*, J. Differential Geom. **42** (1995), 165–192.
113. D. Lehmann and T. Suwa, *Generalization of variations and Baum-Bott residues for holomorphic foliations on singular varieties*, Intern. J. Math. **10** (1999), 367–384.
114. A. Lins Neto, *Algebraic solutions of polynomial differential equations and foliations in dimension two*, Springer Lecture Notes 1345 (1986), Conference on holomorphic dynamics, Mexico, 192–232.

115. A. Lins Neto, *Complex codimension one foliations leaving a compact submanifold invariant*, Dynamical systems and bifurcation theory (Rio de Janeiro 1985), 295–317, Pitman Res. Notes Math. Ser. 160, Longman Sci. Tech. Harlow (1987).
116. E.J.N. Looijenga, *Isolated Singular Points on Complete Intersections*, LMS Lecture Notes **77**, Cambridge Univ. Press 1984.
117. R. MacPherson, *Chern classes for singular varieties*, Ann. of Math **100** (1974), 423–432.
118. D.B. Massey, *Lê Cycles and Hypersurface Singularities*, Springer-Verlag, Lecture Notes in Mathematics **1615**, 1995.
119. D.B. Massey, *Hypercohomology of Milnor fibers*, Topology **35** (1996), no. 4, 969–1003.
120. J. Milnor, *Topology from the Differentiable Viewpoint*, Univ. Press of Virginia, Charlottesville, 1965.
121. J. Milnor, *Singular points of complex hypersurfaces*, Ann. of Math. Studies 61, Princeton 1968.
122. J. Milnor and P. Orlik, *Isolated singularities defined by weighted homogeneous polynomials*, Topology **9** (1970), 385–393.
123. J. Milnor and J. Stasheff, *Characteristic Classes*, Annals of Mathematics Studies **76**, Princeton University Press, Princeton, 1974.
124. M. Morse, *Singular points of vector fields under general boundary conditions*, Amer. Journ. Math. **51** (1929), 165–178.
125. T. Ohmoto, T. Suwa and S. Yokura, *A remark on the Chern classes of local complete intersections*, Proc. Japan Acad. **73** (1997), 93–95.
126. T. Ohmoto and S. Yokura, *Product formulas for the Milnor class*, Bull. Polish Acad. Sci. Math. **48** (2000), no. 4, 387–401.
127. A. Parusiński, *A generalization of the Milnor number*, Math. Ann. **281** (1988), 247–254.
128. A. Parusiński, *Limits of tangent spaces to fibers and the w_f condition*, Duke Math. Journal **72** (1993), 99–108.
129. A. Parusiński and P. Pragacz, *Characteristic numbers of degeneracy loci*, Contemp. Math. **123** (1991), 189–198.
130. A. Parusiński and P. Pragacz, *A formula for the Euler characteristic of singular hypersurfaces*, J. Algebraic Geom. **4** (1995), 337–351.
131. A. Parusiński and P. Pragacz, *Characteristic classes of hypersurfaces and characteristic cycles*, J. Algebraic Geom. **10** (2001), 63–79.
132. V. Poenaru, *Sur la theorie des immersions*, Topology **1** (1962), 81–100.
133. Ch. Pugh, *Generalized Poincaré index formulas*, Topology **7** (1968), 217–226.
134. C. Sabbah, *Quelques remarques sur la géométrie des espaces conormaux*, Astérisque **130** (1985), 161–192.
135. C. Sabbah, *Espaces conormaux bivariants*, Thèse, Université de Paris VII, 1986.
136. K. Saito, *Theory of logarithmic differential forms and logarithmic vector fields*, J. Fac. Sci. Univ. Tokyo Sect. IA **27** (1980), 265–291.
137. J. Schürmann, *A short proof of a formula of Brasselet, Lê and Seade*, math. AG/ 0201316.
138. J. Schürmann, *Topology of singular spaces and constructible sheaves*, Mathematical Monographs-new series, Birkhäuser 2003.
139. M.-H. Schwartz, *Classes caractéristiques définies par une stratification d'une variété analytique complexe*, C.R. Acad. Sci. Paris **260** (1965), 3262–3264, 3535–3537.
140. M.-H. Schwartz, *Classes et caractères de Chern–Mather des espaces linéaires*, C.R. Acad. Sci. Paris **295** 1982, 399–402.
141. M.-H. Schwartz, *Champs radiaux sur une stratification analytique complexe*, Travaux en cours **39**, Hermann, Paris, 1991.
142. M.-H. Schwartz, *Classes de Chern des ensembles analytiques*, Actualités Mathématiques, Hermann, Paris, 2000.

143. J. Seade, *Singular points of complex surfaces and homotopy*, *Topology* **21** (1982), 1–8.
144. J. Seade, *The index of a vector field on a complex surface with singularities*, in “The Lefschetz Centennial Conf.”, ed. A. Verjovsky, *Contemp. Math.* **58**, Part III, Amer. Math. Soc. (1987), 225–232.
145. J. Seade, *The index of a vector field under blow-ups*, *Bol. Soc. Mat. Mexicana* **37** (1992), 449–462.
146. J. Seade, *Remarks on contact structures and vector fields on isolated complete intersection singularities*. Accepted for publication in the Proceedings of the IX Workshop on Real and Complex Singularities, to appear in *Contemporary Mathematics*.
147. J. Seade and T. Suwa, *A residue formula for the index of a holomorphic flow*, *Math. Annalen* **304** (1996), 621–634.
148. J. Seade and T. Suwa, *Residues and topological invariants of singular holomorphic foliations*, *Internat. J. Math.* **8** (1997), 825–847.
149. J. Seade and T. Suwa, *An adjunction formula for local complete intersections*, *Internat. J. Math.* **9** (1998), 759–768.
150. J. Seade, M. Tibăr and A. Verjovsky, *Global Euler obstruction and polar invariants*, *Math. Ann.* **333** (2005), no. 2, 393–403.
151. J. Seade, M. Tibăr and A. Verjovsky, *Milnor numbers and Euler obstruction*, *Bull. Braz. Math. Soc., New Series*, **36** (2005) 275–283.
152. C. T. Simpson, *Higgs bundles and local systems*. *Inst. Hautes Études Sci. Publ. Math.* No. 75 (1992), 5–95.
153. N. Steenrod, *The Topology of Fiber Bundles*, Princeton Univ. Press, 1951.
154. T. Suwa, *Indices of holomorphic vector fields relative to invariant curves on surfaces*, *Proc. of the Amer. Math. Soc.* **123** (1995), 2989–2997.
155. T. Suwa, *Classes de Chern des intersections complètes locales*, *C.R. Acad. Sci. Paris* **324** (1996), 67–70.
156. T. Suwa, *Indices of vector fields and residues of singular holomorphic foliations*, *Actualités Mathématiques*, Hermann, Paris, 1998.
157. T. Suwa, *Dual class of a subvariety*, *Tokyo J. Math.* **23** (2000), 51–68.
158. T. Suwa, *Characteristic classes of coherent sheaves on singular varieties*. *Singularities-Sapporo 1998*, 279–297, *Adv. Stud. Pure Math.*, 29, Kinokuniya, Tokyo, 2000.
159. T. Suwa, *Residues of Chern classes*, *J. Math. Soc. Japan* **55** (2003), 269–287.
160. T. Suwa, *Residues of Chern classes on singular varieties*, *Singularités Franco-Japonaises*, Marseille 2002, *Séminaires et Congrès* **10**, Soc. Math. France, 265–285, 2005.
161. T. Suwa, *Residue Theoretical Approach to Intersection Theory*, *Proceedings of the IX Workshop on Real and Complex Singularities*, São Carlos, Brazil, 207–261, *Contemp. Math.*, 459, Amer. Math. Soc., Providence, RI, 2008.
162. B. Teissier, *Cycles évanescents, sections planes et conditions de Whitney*. *Singularités à Cargèse*. *Astérisque*, Nos. 7 et 8, Soc. Math. France, Paris, p. 285–362, 1973.
163. B. Teissier. *Variétés polaires. II. Multiplicités polaires, sections planes, et conditions de Whitney*. In *Algebraic geometry (La Rábida, 1981)*, volume 961 of *Lecture Notes in Math.*, pages 314–491. Springer, Berlin, 1982.
164. R. Thom, *Quelques propriétés globales des variétés différentiables*, *Comm. Math. Helv.* **28** (1954), 17–86.
165. A.K. Tsikh, *Weakly holomorphic functions on complete intersections, and their holomorphic extension*, *Math. USSR Sbornik*, **61** (1988), 421–436.
166. A. N. Varchenko, *On the local residue and the intersection form on the vanishing cohomology*, *Math. USSR Izvestiya* **26** (1986), 31–52.
167. J.L. Verdier, *Stratifications de Whitney et théorème de Bertini-Sard*. *Invent. Math.*, 36:295–312, 1976.

- 168. J.L. Verdier, *Spécialisation des classes de Chern*, Astérisque 82–83, 149–159, 1981.
- 169. S. Yokura *On a Milnor class*, Preprint 1997.
- 170. C.T.C. Wall, *Topological invariance of the Milnor number mod 2*, *Topology* **22** (1983), 345–350.
- 171. H. Whitney, *Local properties of Analytic Varieties*, Symposium in honor of M. Morse, Princeton Univ. Press, edited by S. Cairns, 1965.
- 172. V.M. Zakalyukin, *Algebraic calculation of the index of a singular point of a vector field*, *Funct. Anal. Appl.* 6, 69–70 (1972).

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- $G(k, m)$ Grassmanian of complex k -planes in \mathbb{C}^m , 129
- H_D^p Čech-de Rham cohomology, 15
- M manifold, 1
- TM tangent bundle of M , 6
- V (real or complex) analytic variety, 31
- V_{reg} the regular part of V , 35
- $V_{k,m}$ Stiefel manifold of orthogonal k -frames in \mathbb{R}^m , 73
- $W_{k,m}$ Stiefel manifold of unitary k -frames in \mathbb{C}^m , 7
- \mathbb{B}_ε closed ball with radius ε , 33
- \mathbb{D}_δ closed disk with radius δ , 56
- \mathbf{F}_t Milnor fiber, 47
- Ω_V cotangent sheaf of V , 212
- Θ_V tangent sheaf of V , 212
- $\chi(\)$ Euler–Poincaré characteristic, 2
- $\chi_\pm(\)$ semi-characteristic, 79
- $\text{Ind}_{\text{GSV}_2}$ modulo (2) GSV index, 75
- Ind_{GSV} GSV index, 47
- Ind_{PH} Poincaré–Hopf index, 2
- Ind_{Sch} Schwartz index, 32
- Ind_{Vir} virtual index, 91
- Ind_{hom} homological index, 117
- Ind_{rad} radial index, 32
- \mathbb{CP}^m projective space, 14
- \mathcal{O}_V structure sheaf, 207
- \mathcal{T}_V cellular tube around V , 4
- $\mu_r(V, S)$ Milnor class localized at S , 193
- μ Milnor number, 26
- $\mu_r(V)$ Milnor class of V , 194
- ∇ a connection, 11
- $\overline{\text{grad}}(f)$ complex conjugate of gradient vector field of f , 46
- σ a simplex or cell, 4
- \mathbb{S}^n n -dimensional sphere, 2
- φ a symmetric polynomial, 15
- \tilde{V} the Nash transform of V , 130
- $\tilde{c}^i(V)$ Schwartz class of V in $H^*(M, M \setminus V)$, 175
- $\{V_\alpha\}_{\alpha \in A}$ a stratification, 33
- a_σ the barycenter of σ , 4
- $c^i(M)$ i^{th} -Chern class of M , 7
- $c^i(\nabla)$ i^{th} -Chern form of ∇ , 13
- $c^i(\nabla, \nabla')$ Bott’s difference form, 13
- $c_{\text{vir}}^i(V)$ virtual class in cohomology, 186
- $c_{\text{FJ}}^{\text{FJ}}(V)$ Fulton–Johnson class, 186
- $c_j^{\text{Ma}}(V)$ Mather class, 182
- $c_j^{\text{SM}}(V)$ Schwartz–MacPherson class of V in $H_*(V)$, 183
- $d(v, v')$ difference of the indices of v, v' , 5, 73
- $m(f, S)$ multiplicity of f at S , 26
- $v^{(r)}$ r -field or r -frame, 7
- v_{rad} radial vector field, 32
- $\text{ch}^*(\mathcal{F})$ Chern character of the coherent sheaf \mathcal{F} , 201
- $\text{Eu}_V(v, x)$ local Euler obstruction of a vector field v , 132
- $\text{Eu}_V(x)$ local Euler obstruction, 130
- $\text{Eu}_{f,V}(x)$ local Euler obstruction of a function f , 139
- $\text{PH}(v^{(r)}, S)$ Poincaré–Hopf class of $v^{(r)}$ localized at S , 10
- $\text{Res}_\varphi(\gamma, E; S)$ residue of $\varphi(E)$ at S with respect to γ , 21
- $\text{Sch}(v^{(r)}, S)$ Schwartz class of r -field $v^{(r)}$ localized at S , 181
- $\text{ch}_*(\mathcal{F})$ homology Chern character of a coherent sheaf \mathcal{F} , 210
- $\text{Sing}(V)$ the singular part of V , 34
- adjunction formula, 93
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