

# Jingzhi Tie

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Watkinsville, Georgia 30677  
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- EDUCATION**
- ◇ **University of Toronto**, Toronto, Canada.  
Ph.D. in Mathematics, June 1995.  
Thesis Title: Analysis on the Heisenberg Group and its Application to Complex Analysis.  
Advisor: Peter C. Greiner.
  - ◇ **University of Victoria**, Victoria, Canada.  
M.Sc. in Applied Mathematics, November 1989.  
Thesis Title: Derivation of the Boltzmann Equations from BBGKY Hierarchy.  
Advisor: Reinhard Illner.
  - ◇ **Lanzhou University**, Lanzhou, China.  
B.Sc. in Mathematics, July 1985.
- AWARDS**
- ◇ January 2007–December 2007, NSC of Republic of China Grant.
  - ◇ January 2000–December 2000, UGARF research grant.
  - ◇ August 1996–July 1998, NSERC postdoctoral fellowship.
  - ◇ November 30, 1995, The Malcolm Slingsby Robertson Prize for Best Dissertation.
  - ◇ May 1992–May 1995, Ontario Graduate Scholarships.
  - ◇ Sept. 1990–May 1992, Department of Mathematics Scholarships.
  - ◇ Sept. 1987–Sept. 1989, University of Victoria Fellowships.
- RESEARCH INTERESTS**
- Geometric Analysis on nilpotent Lie group.
  - Harmonic analysis on the Heisenberg group.
  - Pseudo-differential and singular integral operators, partial differential equations.
  - Several complex variables.
- RESEARCH PROJECTS**
- ◇ Sub-gradient estimates and Liouville-type theorems for the CR heat equation on the Heisenberg group.  
Collaborators: Shu-Cheng Chang and Chin-Tung Wu.
  - ◇ The sub-Riemannian Geometry on the Engel group.  
Collaborator: Malcolm F. Adams.
  - ◇ Mathematical Finance.  
Collaborator: Qing Zhang and Duy Nguyen
- ACADEMIC POSITION HELD**
- ◇ 2014-, Professor, University of Georgia.
  - ◇ 2006-2014, Associate Professor with tenure, University of Georgia.
  - ◇ January 2007-December 2007, Visiting Associate Researcher, Academia Sinica, Republic of China.
  - ◇ 1999–2005, Assistant Professor, University of Georgia.
  - ◇ 1998-1999, Visiting Assistant Professor, University of California, Irvine.

- ◇ 1996-1998, NSERC Postdoctoral Fellow, University of Maryland at College Park, The Fields Institute and Yale University.
- ◇ 1994-1996, Instructor, University of Toronto.

PUBLICATION **Monographs**

- ◇ [1.] (Joint with **Carlos Berenstein** and **Der-Chen Chang**) **Laguerre Calculus and its Applications to Harmonic Analysis on the Heisenberg Group**. AMS/IP Studies in Advanced Mathematics, vol. **22**, American Mathematical Society, International Press, 328pp, **2001**.
- ◇ [2.] (Joint with **D-C. Chang** and **P.C. Greiner**) **Analysis on the Model Weakly Pseudo-Convex Domain**. In preparation.

**Journal Articles**

- ◇ [1.] (Joint with **R. Illner**), On Directed Diffusion with Measurable Background, *J. Math. Meth. in Appl. Sci.* Vol. **16**, 681-690, **1993**.
- ◇ [2\*.] Embedding  $\mathbf{C}^1$  into  $\mathbf{H}_1$ , *Canad. J.Math.* Vol. **47**(6), 1317-1328, **1995**.
- ◇ [3\*.] The Inverse of Some Differential Operators on the Heisenberg Group, *Comm. in PDEs*, vol.**20**, No.**7 & 8**, 1275-1302, **1995**.
- ◇ [4\*.] (Joint with **Der-Chen Chang**) Estimates for Spectral Projection Operators of the Sub-Laplacian on the Heisenberg Group. *J. Analyse. Math.* vol.**71**, 315-347, **1997**.
- ◇ [5\*.] The Explicit Solution of the  $\bar{\partial}$ -Neumann Problem in the Non-isotropic Siegel Domain. *Canad. J. Math.*.. vol.**49** no. **6**, 1299-1322, **1997**.
- ◇ [6.] (Joint with **Der-Chen Chang**) Applications of Laguerre calculus to Dirichlet problem of the Heisenberg Laplacian. Finite or infinite dimensional complex analysis (Fukuoka, 1999), 47–53, *Lecture Notes in Pure and Appl. Math.*, vol. **214**, Dekker, New York, **2000**.
- ◇ [7\*.] (Joint with **Der-Chen Chang**) Estimates for the Powers of the sub-Laplacian on the Non-isotropic Heisenberg Group. *J. Geo. Analysis*, vol. **10**, no. 4, 653–678, **2000**.
- ◇ [8\*.] (Joint with **Der-Chen Chang**) An identity related to the Riesz Transforms on the Heisenberg Group. *Complex Variables Theory Appl.* vol.**40**, no. 4, 395–421, **2000**.
- ◇ [9\*.] (Joint with **Der-Chen Chang**) Some Differential Operators Related to the Heisenberg Sub-Laplacian. *Math. Nach.* vol. **221**, 19–39, **2001**.
- ◇ [10\*.] (Joint with **Der-Chen Chang** and **Robert Gilbert**) Bergman Projection and Weighted Holomorphic Functions, **Operator Theory: Advances and Applications**. **143**, 147-169, **2003**.
- ◇ [11.] (Joint with **Der-Chen Chang** and **Peter Greiner**) Sub-Riemannian Geometry and Subelliptic PDEs, **Function Theory in Several Complex Variables**, Editors: **Carl H FitaGerald** and **Sheng Gong**, *Proceedings of a Satellite Conference to the ICM in Beijing 2002*, 1-36, **2004**.
- ◇ [12\*.] (Joint with **Der-Chen Chang**) Hermit operator and Subelliptic Operators, *Acta Math. Sin. (Engl. Ser.)* **21**, no. 4, 803–818 **2005**.
- ◇ [13\*.] (Joint with **Ovidiu Calin** and **Der-Chen Chang**) Hermite Operator on the Heisenberg Group, *Harmonic Analysis, Signal Processing and Complexity: Festschrift in Honor of the 60th Birthday of Carlos A. Berenstein*, 37-54, **2005**.
- ◇ [14\*.] The fundamental solution and heat kernel of the twisted Laplacian on  $\mathbb{R}^{2n}$ . *Communication in PDEs*, **31**, no.7-9,1047–1069, **2006**.
- ◇ [15\*.] (Joint with **Ovidiu Calin** and **Der-Chen Chang**) Fundamental Solutions for Hermite and Subelliptic Operators, *J. Analyse. Math.*, **100**, 223–248, **2006**.
- ◇ [16\*.] (Joint with **Der-Chen Chang** and **Peter Greiner**) Laguerre Calculus on the Heisenberg group and Bessel-Fourier transform on  $\mathbb{C}^n$ , *Sciences in China, Series A*, **49**, no. 11, 1722–1739, **2006**.

- ◇ [17\*.] (Joint with **M.W. Wong**) The wave kernel of the twisted Laplacian on  $\mathbb{C}^n$ , Modern trends in pseudo-differential operators, 107–115, *Oper. Theory Adv. Appl.*, **172**, **2007**.
- ◇ [18.] (Joint with **Der-Chen Chang** and **Peter C. Greiner** ) A Geometric Formula for the Fundamental Solution of the Kohn Laplacian, *Proceedings of ICCM*, **2007**.
- ◇ [19\*.] (Joint work with **M.W. Wong**) The Heat Kernel and Green Functions of Sub-Laplacians on the Quaternion Heisenberg Group, *Journal of Geometric Analysis*, **19**, 191-210, **2009**.
- ◇ [20\*.] (Joint with **Der-Chen Chang** and **Shu-Cheng Chang**) Laguerre Calculus and Paneitz Operator on the Heisenberg group, *Sci. China Ser. A*, **52**, No. 12, 2549-2966, **2009**.
- ◇ [21\*.] (Joint with **Shucheng Chang** and **Chin-Tung Wu**) Subgradient Estimate and Liouville-type Theorems for the CR Heat Equation on Heisenberg groups, *Asian Journal of Mathematics*, Volume 14, Number 1, 41-72, March **2010**.
- ◇ [22\*.] (Joint with **Malcolm R. Adams**), On Sub-Riemannian Geodesics on the Engel Groups: Hamilton's Equation, *Mathematische Nachrichten*, Volume **286**, Issue **14-15**, 1381-1406, October **2013**.
- ◇ [23\*.] (Joint with **Duy Nguyen** and **Qing Zhang**), Stock Trading Rules under a Switchable Market, *Mathematical Control and Related Fields*, Volume 3, Number 2, 209-231, June **2013**.
- ◇ [24\*.] (Joint with **Duy Nguyen** and **Qing Zhang**), An Optimal Trading Rule Under A Switchable Mean-Reversion Model, *Journal of Optimization Theory and Applications*, Volume **161**, 145-163, **2014**.
- ◇ [25\*.] (Joint with **Der-Chen Chang** and **Shu-Cheng Chang**), Calabi-Yau Theorem and Hodge-Laplacian Heat Equation in a Closed Strictly Pseudoconvex CR Manifold, *Journal of Differential Geometry*, Volume **97**, 395-425, **2014**.
- ◇ [26\*.] (Joint with **Shu-Cheng Chang**, **Yen-Wen Fan** and **Ting-Jung Kuo**), Matrix Li-Yau-Hamilton Inequality for the CR Heat Equation in Pseudo-Hermitian  $(2n+1)$ -Manifolds, *Mathematische Annalen*, Online First May 2014.

**Works not yet Accepted**

- ◇ [27\*.] (Joint with **Shu-Cheng Chang** and **Ting-Jung Kuo**), Yau's Gradient Estimate and Liouville Theorem for Positive Pseudoharmonic Functions in a Complete Pseudohermitian  $(2n+1)$ -manifold, Submitted to *Communications in PDEs*, November 2013. Revised version on November 2014.
- ◇ [28\*.] (Joint with **Qing Zhang**), An Optimal Mean-Reversion Trading Rule under a Markov Chain Model, submitted to *SIAM J Control and Optimization*, October 2014.

TEACHING      Courses taught:

- ◇ Fall 1999: Calculus (**57**)(two sections).
- ◇ Spring 2000: ODE (**27**) .
- ◇ Fall 2000: Calculus (**32**), Real Analysis(**7**).
- ◇ Spring 2001: PDEs (**7**).
- ◇ Summer 2001: Calculus (**30**).
- ◇ Fall 2001: Calculus (**64**) (two sections).
- ◇ Spring 2002: Calculus (**35**).
- ◇ Summer 2002: ODEs (**29**).
- ◇ Fall 2002: Calculus (**60**) (two sections).
- ◇ Spring 2003: Graduate PDEs (**10**), First-Year Seminars(**15**).

- ◇ Summer 2003: ODE (17).
- ◇ Fall 2003: Calculus (30), Real Analysis (7).
- ◇ Spring 2004: Introduction to Analysis (31).
- ◇ Summer 2004: ODE (19).
- ◇ Fall 2004: Calculus (35), Integral Calculus (28).
- ◇ Spring 2005: Geometry for Elementary Teachers (30), Freshman Seminar (14).
- ◇ Fall 2005: Calculus (35), Real Analysis (14).
- ◇ Spring 2006: Introduction to PDEs (15).
- ◇ Summer 2006: Introduction to Differential Equations (20).
- ◇ Fall 2006: Calculus (25), Geometry for Elementary Teachers (35).
- ◇ Spring 2008: Calculus (two sections 30), Introduction to PDEs (9).
- ◇ Summer 2008: Introduction to Differential Equations (20).
- ◇ Fall 2008: Integral Calculus (29), Sequences and Series (16).
- ◇ Spring 2009: Calculus (28), Graduate Complex Analysis (13).
- ◇ Summer 2009: Introduction to Differential Equations (20).
- ◇ Fall 2009: Integral Calculus (29).
- ◇ Spring 2010: Multivariable Calculus (23), Introduction to Differential Equations (21).
- ◇ Summer 2010: Introduction to Higher Mathematics (22)
- ◇ Fall 2010: Real Analysis (13), Foundation of Geometry I (28).
- ◇ Spring 2011: Foundation of Geometry II (14).
- ◇ Summer 2011: Multivariable Calculus (40)
- ◇ Fall 2011: Calculus (70).
- ◇ Spring 2012: Graduate PDEs (14).
- ◇ Summer 2012: Introduction to Higher Mathematics (20)
- ◇ Fall 2012: Real Analysis (11), Integral Calculus (36)
- ◇ Spring 2013: Real Analysis II (7).
- ◇ Summer 2013: Introduction to Higher Mathematics (18)
- ◇ Fall 2013: Sequences and Series (21)
- ◇ Spring 2014: Introduction to PDEs (21), Graduate Complex Analysis (13).
- ◇ Summer 2014: Introduction to Higher Mathematics (16)
- ◇ Fall 2014: Introduction to Higher Mathematics (35), Multivariable Calculus (70)

GRADUATE  
STUDENTS

- ◇ Preliminary Advisor: Emily Jennings.
- ◇ Co-Advisor: Duy Nguyen (2009-2013) Phong Luu (2010-),.
- ◇ **Ph.D. Committee:** Moustapha Pemy, Jianbao Wu, Lirong Yu, Chao Zhuang, Jie Yu, Yang Liu, Dong-Hoon Shin, etc.
- ◇ **Qual Exam Committee:** Real Analysis (6 times), Complex Analysis (4), Algebra (1).

SEMINARS

- ◇ Organize and give talks in the analysis seminars, harmonic analysis seminars.
- ◇ Talks in applied math seminar, probability seminar, sub-Riemannian geometry seminar and VIGRE seminar.

INVITED  
TALKS

- ◇ [1.] Fundamental solutions of some differential operators on the Heisenberg groups. *Analysis, PDEs and Mathematical Physics Seminar*, University of Toronto, Jan. 30, 1995.
- ◇ [2.] The explicit solution of the  $\bar{\partial}$ -Neumann problem in the non-isotropic Siegel domain. *Analysis Seminar*, York University, Oct. 6, 1995.
- ◇ [3.] The explicit solution of the  $\bar{\partial}$ -Neumann problem in the non-isotropic Siegel domain. Contributed talk in *CMS Winter Meeting*, Simon Fraser University, Dec. 9 1995
- ◇ [4.] The  $\bar{\partial}$ -Neumann problem. *Complex and Harmonic Analysis Seminar*. University of Maryland, March 20, 1997.
- ◇ [5.] Boundary value problem of sub-elliptic operator. *Complex and Harmonic Analysis Seminar*. University of Maryland, Sept. 19, 1997.
- ◇ [6.]  $\bar{\partial}$ -Neumann problem. Workshop on *Microlocal Methods in Geometric Analysis and Mathematical Physics*, the Fields Institute, Oct. 27, 1997.
- ◇ [7.] The Riesz transform on the Heisenberg group. *Analysis Seminar*. Yale University, April 17, 1998.
- ◇ [8.] Singular integrals characteristions of  $\mathbf{H}^p$  on the Heisenberg group. *Complex and Harmonic Analysis Seminar*. University of Maryland, April 30, 1998
- ◇ [9.]  $\bar{\partial}$  operators. *Analysis Seminar*, University of California at Irvine, Oct. 13, 1998.
- ◇ [10.] Heisenberg group and  $\bar{\partial}$  operators. *Colloquium*, University of Georgia, March 15, 1999.
- ◇ [11.] Laguerre functions and analysis on the Heisenberg Group. *NATO Advanced Study Institute: Special Functions 2000*, Arizona State University, Tempe, Arizona, U.S.A. May 29 to June 9, 2000
- ◇ [12.] Solvability of PDO on the Heisenberg Group. *AMS/MAA Southeast Conference*, Georgia Institute of Technology, Atlanta, GA, March 8-11, 2002.
- ◇ [13.] Laguerre Calculus on the Heisenberg group and Fourier-Bessel transform on  $C^n$ . *Workshop in analysis and geometry in Carnot-Caratheodory spaces*, University of Arkansas, March 7-8,2003.
- ◇ [14.] Heisenberg group and its connection with complex analysis. *Colloquium*, Department of Mathematics, Florida International University, January 29, 2004.
- ◇ [15.] Laguerre Calculus. *Analysis Seminar*, Department of Mathematics and Statistics, York University, March 8, 2004.
- ◇ [16.] Laguerre Calculus on the Heisenberg group and Fourier-Bessel transform on  $C^n$ . *AMS Southeast Conference*, Florida State University, Tallahassee, March 11, 2004.
- ◇ [17.] Fundamental solution of the Hermite operator on the Heisenberg group. *AARMS-CRM Workshop on Singular Integrals and Analysis on CR Manifolds*, Dalhousie University, Halifax, Nova Scotia, May 2-May 9, 2004.
- ◇ [18.] Fundamental solution of the Kohn Laplacian on the quadratic CR Manifolds. *Seventh New Mexico Analysis Seminar*, University of New Mexico, Albuquerque, New Mexico, October 14-17, 2004.
- ◇ [19.] Fundamental solution of the twisted Laplacian on  $C^n$ . *Minimal Surfaces, Subelliptic PDEs and Geometric Analysis*, Dartmouth College, March 8-12,2005.
- ◇ [20.] Analysis on the Heisenberg group and its connection with complex analysis. *Colloquium*, Inner Mongolia University, July 21, 2005.
- ◇ [21.] PDEs on the Heisenberg group. *Lecture series*, Lanzhou University, July 23 to July 27, 2005.
- ◇ [22.] Sub-Riemannian Geometry on the Heisenberg group. *Lecture series*, Nankai University, July 31 to Aug 5, 2005.

- ◇ [23.] Analysis on the Quadratic CR-manifold. *The 13th International Conference on Finite or Infinite Dimensional Complex Analysis and Applications (ICFIDCAA 2005)*, Shantou University, China, Aug. 8-12, 2005.
- ◇ [24.] Analysis on the Engel Fields. *Workshop on Analytic and Algebraic Methods in Complex and CR Geometry*, BIRS, Banff, Canada, Sept. 3-8, 2005.
- ◇ [25.] Sub-Riemannian Geometry on Engel Group. Workshop on Geometrical Analysis, National Center for Theoretical Sciences, Hsinchu, Taiwan, January 16, 2007.
- ◇ [26.] The solution of Hamilton's equations on Engel group. Workshop On Geometry and Analysis, Academic Sinica, Taipei, Taiwan, March 5, 2007.
- ◇ [27.] Laguerre Calculus and Analysis on the Heisenberg group. 2007 NCTS Topical Program in Analysis and Geometry, May 4, 11, 18, 2007.
- ◇ [28.] Sub-Riemannian Geometry on the Heisenberg group. NTU, Student-Faculty Colloquium. June 4, 2007.
- ◇ [29.] Sub-Riemannian Geometry and Elliptic Integrals. Students-Faculty Colloquium, Hong Kong University of Science and Technology. June 29, 2007.
- ◇ [30.] Sub-Riemannian Geometry on the Heisenberg Group and Engel Group. Colloquium, Zhongshan University, June 31, 2007.
- ◇ [31.] Solvability of linear PDEs. Colloquium, Tatong University. Nov. 11, 2007.
- ◇ [32.] Carnot-Caratheodory Distance on the Heisenberg group. Geometry Seminar, National Central University. Nov. 21, 2007.
- ◇ [33.] Sub-Riemannian Geometry on  $\mathbb{R}^4$ . Annual Meeting of Mathematical Society of ROC, Academic Sinica, Dec. 23, 2007.
- ◇ [34.] Geometric Analysis on the Heisenberg Group, Colloquium, MUN, St. Johns, Canada, April 25, 2008.
- ◇ [35.] Weighted Sobolev Spaces on Heisenberg Group, Workshop on Harmonic Analysis, NCTS, Hsinchu, Taiwan, May 16, 2008.
- ◇ [36.] Weighted Sobolev Spaces on Heisenberg Group, Workshop on Pseudo-Differential Operators and Complex Analysis, York University, Toronto, August 4th, 2008.
- ◇ [37.] Boundary Value Problem of Sub-Laplacian on the Heisenberg Group, Geometry and Analysis Seminar, TIMS, NTU, Taipei, June 2, 2009.
- ◇ [38.] Spherical Harmonics on the Heisenberg Group, Geometry and Analysis Seminar, TIMS, NTU, Taipei, May 28, 2010.
- ◇ [39.] The Sube-Laplacian Comparison Theorem in a Complete Pseudo-Hermitian 3-Manifold, Spring Lecture Series, Department of Mathematics, University of Arkansas, April 9th, 2011.
- ◇ [40.] Sub-Riemannian Geometry on Pseudo-Hermitian manifold. Geometry Seminar, Taida Institute of Mathematical Sciences, National Taiwan University, December 22, 2012.

- CONFERENCE ATTENDED ◇ [1.] *NATO Advanced Study Institute: Harmonic Analysis*. At the Il Ciocco Resort Hotel, Tuscany, Italy. July 2 to July 15, 2000.
- ◇ [2.] *SEAM XVII Conference 2001*, Organizing committee, University of Georgia, Athens, March 2-3, 2001.
  - ◇ [3.] *AMS-IMS-SIAM summer research conference on Harmonic Analysis*, Mount Holyoke College, South Hadley, MA. June 24- July 5, 2001.
  - ◇ [4.] *Spring Lecture Series in Mathematical Sciences*, University of Arkansas, April 11-13, 2002.
  - ◇ [5.] *CBMS Conference*, the University of North Carolina, May 13-18, 2002
  - ◇ [6.] *CBMS Conference*, Wayne State University, May 18-22, 2003.

- ◇ [7.] Organizing a special session on Harmonic Analysis and PDEs. *the Fourth ISAAC Congress*, York University in Toronto, Canada, August 11-16, 2003.
- ◇ [8.] *A Celebration of Carlos Berenstein's Mathematics: Harmonic Analysis, Signal Processing and Complexity*, at George Mason University, Fairfax, Virginia, May 17-22, 2004.
- ◇ [9.] *NSF/CBMS Regional Conference in the Mathematical Sciences*, The School of Mathematics at Georgia Institute of Technology, May 23 - 28, 2004.
- ◇ [10.] 1999-2001: Organize the Harmonic Analysis Seminars. Give numerous talks in the Analysis Seminar.
- ◇ [11.] *54th Midwest PDE seminar*, Wayne State University, November 19-21, 2004.
- ◇ [12.] *Conference in Complex Analysis*. University of Wisconsin, Madison, March 16-19, 2006.
- ◇ [13.] *International Conference on Geometric Analysis*, NTU June 18-23, 2007.
- ◇ [14.] *Spring Lecture Series*, Department of Mathematics, University of Arkansas, April 12-14, 2012

SERVICES

- ◇ **Fall 2000-Spring 2001:** Personnel committee.
- ◇ **2002:** Kossack Calculus Committee.
- ◇ **2003:** Kossack Calculus Committee.
- ◇ **2004-06:** Graduate Committee.
- ◇ **2010-2012:** Executive Committee.
- ◇ **2012-2014:** Curriculum Committee.
- ◇ **2013:** Kossack Calculus Committee.