Curriculum Vitae

Darren C. Ong
Associate Professor of Mathematics,
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Malaysia.

Date of Birth : 9 February 1987

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Citizenship : Malaysia

Language proficiency : English (fluent), Malay (fluent)

Previous Work History

Postdoctoral Faculty, University of Oklahoma Department of Mathematics, Norman, USA. (8/2014-5/2016)

Education History

Ph.D. Mathematics, Rice University (2014)
Thesis Title : Spectral characteristics of aperiodic CMV and Schrödinger operators
Thesis Advisor : David Damanik

M.A. Mathematics, Rice University (2012)

B.Sc. Mathematics, Texas Christian University (2009) *Summa cum Laude*
Thesis Title : On a theorem of intersecting conics
Thesis Advisor : Scott Nollet

Professional Membership

Editorial board member of the Bulletin of the Malaysian Mathematical Sciences Society.
Affiliate Member of the American Mathematical Society.

Research Interests

Research areas: Orthogonal polynomials; spectral theory of Schrödinger operators; quantum dynamics; mathematical physics.

AMS Mathematics Subject Classification: 46, 47, 81.

Curriculum Vitae

Research Experience

Accepted Publications:

"Restrictions on the existence of a canonical system flow hierarchy" (with I. Hur). *Integral Equations and Operator Theory* **93,** Number 40 (2021). ISSN: 0378-620X

"Subordinacy theory for extended CMV matrices" (with S. Guo and D. Damanik). To appear in *Science China Mathematics.* arXiv:2005.04696

"Quasiperiodic music". *The Journal of Mathematics and the Arts* **14**, Issue 4, 285-296 (2020) ISSN: 1751-3472

"Sharp spectral transition for eigenvalues embedded into the spectral bands of perturbed periodic operators" (with W. Liu). *Journal d'Analyse Mathematique **141***, 625–661 (2020) ISSN: 0021-7670

"Generalized Toda flows" (with C. Remling). *Transactions of the American Mathematical Society* **371**, Issue 7, 5069–5081(2019)**.** ISSN: 0002-9947

"Spectral Approximation for Ergodic CMV Operators with an Application to Quantum Walks" (with J. Fillman and T. Vandenboom). *Journal of Mathematical Analysis and Applications* **467,** 132-147 (2018). ISSN: 0022-247X

"On a description of the Toda hierarchy using cocycle maps". *Linear Algebra and its Applications.* **549**, 12-29 (2018). ISSN 0024-3795

"A condition for purely absolutely continuous spectrum for CMV operators using the density of states" (with J. Fillman). *Proceedings of the American Mathematical Society*, **146**, Issue 2, 571-580 (2018). ISSN: 0002-9939

"Purely Singular continuous spectrum for limit-periodic CMV operators with applications to quantum walks" (with J. Fillman). *Journal of Functional Analysis* . **272.12** 5107–5143 (2017). ISSN: 0022-1236

"Spectral Characteristics of the Unitary Critical Almost-Mathieu Operator" (with J. Fillman and Z. Zhang). *Communications in Mathematical Physics.* **351.2**, 525-561 (2017). ISSN: 0010-3616

"Generalized Prüfer variables for perturbations of Jacobi and CMV matrices" (with M. Lukic). *Journal of Mathematical Analysis and Applications* **444,** 1490-1514 (2016). ISSN: 0022-247X

"Spreading estimates for quantum walks on the integer lattice via power-law bounds on transfer matrices" (with D. Damanik and J. Fillman). *Journal de Mathématiques Pures et Appliquées* **105.3,** 293-341 (2016). ISSN: 0021-7824

"Wigner-von Neumann type perturbations of periodic Schrödinger operators" (with M.Lukic). *Transactions of the American Mathematical Society* **367,** 707-724 (2015). ISSN: 0002-9947

"Hölder continuity of spectral measures of an extended CMV matrix" (with P. Munger). *Journal of Mathematical Physics* **55,** 093507 (2014). ISSN: 0022-2488

“Purely singular continuous spectrum for CMV operators generated by subshifts”. *Journal of Statistical Physics* **155**, 763-776 (2014). ISSN: 0022-4715

“Orthogonal polynomials on the unit circle with quasiperiodic Verblunsky coefficients have generic purely singular continuous spectrum”. Discrete and Continuous Dynamical Systems. Proceedings of the 9th AIMS Conference Special Issue, pp. 605–609 (2013).

“Limit-periodic Verblunsky coefficients for orthogonal polynomials on the unit circle”. *Journal of Mathematical Analysis and Applications* **394.2,** 633-644 (2012). ISSN: 0022-247X

“On a theorem of intersecting conics”. *Forum Geometricorum* **11,** 95-107 (2011).

“The Frobenius number of geometric sequences” (with V.Ponomarenko). *INTEGERS: The Electronic Journal of Combinatorial Number Theory* **8**, A33 (2008). ISSN: 1553-1732

Preprint:
“Simon's OPUC Hausdorff Dimension Conjecture (with S. Guo and D. Damanik). arXiv:2011.01411

Grants (All as Principal Investigator)

Fundamental Research Grant Scheme (Malaysian Ministry of Education), “Spreading rates of quantum random walks in an almost periodic environment, with potential applications in quantum computing”. Oct 2018-Sep 2021. RM75,000

XMUM Research Fund, “Canonical Systems and Aperiodic Order”. 1 Jan 2020- 31 Dec 2021. RM 20,000

XMUM Research Fund, “Spectral analysis of almost periodic and perturbed periodic operators, with applications to quantum walks”. 1 Feb 2018- 31 Jan 2020. RM 20,000

Research Programmes
Participant, 2012 Arbeitsgemeinschaft: Quasiperiodic Schrödinger Operators, Mathematisches Forschungsinstitut Oberwolfach.

Participant, 2007 NSF Research Experiences for Undergraduates Program, Brigham Young University. Faculty Mentor: Michael Dorff.

Participant, 2006 NSF Research Experiences for Undergraduates Program, Trinity University. Faculty Mentor: Vadim Ponomarenko.

Non-academic publications:

“The Trampolines that Nadia built” (Illustrated by Anngee Neo), Epigram Books, Singapore (2018). ISBN: 9789810732585

Invited Talks

16th IMT-GT International Conference of Mathematics, Statistics, and their Applications (2020). "Quasiperiodic music". W*inner of Best Virtual Presentation Award*

Departmental Seminar, University of Bielefeld, Bielefeld, Germany (2019). "Aperiodic Random Walks".

11th St Petersburg Conference in Spectral Theory, St Petersburg, Russia (2019), "Sharp spectral transition for eigenvalues embedded into the spectral bands of perturbed periodic operators".

Joint Meeting of the Korean Mathematical Society and Deutsche Mathematiker-Vereinigung, Seoul, South Korea (2018), "The Unitary Almost-Mathieu Operator".

Departmental Seminar, Pusat Pengajian Sains Matematik, University Sains Malaysia, Penang, Malaysia (2018). "Aperiodic Order".

AMS Special Session on Spectral Theory, Western Spring Sectional Meeting, Portland, USA (2018), "Purely singular continuous spectrum for limit-periodic CMV operators with applications to quantum walks".

36th Annual Western States Mathematical Physics Meeting, University of California- Irvine, USA (2018). "Generalized Toda flows".

Geometry-Analysis seminar, Rice University, USA (2018). "Generalized Toda flows".

Oberwolfach Workshop on Spectral Structures and Topological Methods in Mathematical Quasicrystals, Mathematisches Forschungsinstitut Oberwolfach, Germany (2017), "Quasicrystalline structures and quantum walks".

Mathematical Physics Seminar, University of California-Irvine Mathematics Department, Irvine, USA (2017), "A generalization of the KdV hierarchy to canonical systems.**".**

Special Seminar, University of Oklahoma Mathematics Department, Norman, USA (2017), "A generalization of the KdV hierarchy to canonical systems.**".**

INSPEM Mathematical Physics Seminar, University Putra Malaysia, Serdang, Malaysia (2016), "Some results on the spreading of a quantum walk, using ideas from spectral theory and orthogonal polynomials".

Program Bual Bicara Akademik, Kolej Matrikulasi Selangor, Banting, Malaysia (2016), "Asal kemahiran matematik: bakat atau latihan?"

Frank Stones Memorial Colloquium, Texas Christian University, Fort Worth, USA (2016), "Some results on the spreading of a quantum walk, using ideas from spectral theory and orthogonal polynomials".

AMS Special Session on Spectral Theory of Ergodic Schrödinger Operators and Related Models, Western Fall Sectional Meeting, Fullerton, USA (2015), "A characterization of generalized Toda

flows using cocycle dynamics".

AMS Special Session on Spectral Theory, Disorder, and Quantum Many Body Physics, Central Spring Sectional Meeting, East Lansing, USA (2015), "Decaying oscillatory perturbations of periodic Schrödinger Operators".

Mathematical Physics Seminar, University of California-Irvine Mathematics Department, Irvine, USA (2015), "Decaying oscillatory perturbations of periodic Schrödinger Operators**".**

AMS Special Session on Spectral Theory, Western Spring Sectional Meeting, Albuquerque, USA (2014), "Uniform absence of point spectrum for the period doubling CMV operator".

AMS Special Session on Quantum Walks, Quantum Computation and Related Topics, 2014 Joint Mathematics Meeting, Baltimore, USA (2014), "Results on the Hölder continuity of spectral measures of an extended CMV matrix".

Mathematical Physics Seminar, University of California-Irvine Mathematics Department, Irvine, USA (2013), "New results concerning the extended CMV operator**".**

Invited Colloquium Speaker, Texas Christian University Mathematics Department, Fort Worth, USA (2012), "Limit-periodicity of the recurrence coefficients of orthogonal polynomials corresponding to measures on the unit circle".

The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, USA (2012) , "Orthogonal polynomials on the unit circle with almost periodic recursion coefficients".

Spectral Theory and Dynamics of Cocycles Minisymposium, Equadiff in Loughborough, United Kingdom (2011), "Limit-periodic Verblunsky coefficients in OPUC".

Teaching Experience

The following YouTube channel that contains lecture videos I use to supplement my classroom teaching. My channel has 150 subscribers and over 75,000 views:
https://www.youtube.com/user/DarrenOngCL

Classes Taught

(all undergraduate level)

Single variable calculus, Multivariable calculus, Linear algebra,Ordinary differential equations, Partial differential equations, Game theory, Discrete Mathematics, Complex Analysis, Real Analysis

Awards and Honors

- Third Prize, Art Category, 2020 CARMA Maths Art/Poster Competition, University of Newcastle, Australia
- Best Virtual Presentation Award, 16th IMT-GT International Conference of Mathematics, Statistics, and their Applications 2020.
- 2009 Phi Beta Kappa Senior Scholar, Texas Christian University.
- 2009 Mathematics Senior Scholar, Texas Christian University .

Curriculum Vitae

- Inductee, Pi Mu Epsilon (Mathematics honor society) 2008.
- Chancellor's Scholarship, Texas Christian University, 2005-2009.
- Bronze Medalist, International Mathematical Olympiad 2004 in Athens, Greece.
- Honorable Mention, International Mathematical Olympiad 2002 in Glasgow, UK.
- Participant, International Mathematical Olympiad 2003 in Tokyo, Japan.