

Research Interests

Geometric analysis, Riemannian geometry, geometric inverse problems, materials science.

Education and Academic Employment

- **Ph.D. in Mathematics**, The Hebrew University of Jerusalem *2022–present*
Azrieli Fellow.
Advisor: Prof. Raz Kupferman.
Thesis: *Generalized Hodge theory and its applications in geometric analysis.*

- **M.Sc. in Mathematics**, The Hebrew University of Jerusalem *2019–2021*
Advisor: Prof. Raz Kupferman.
Thesis: *Double forms: Regular elliptic bilaplacian operators and applications.*

- **B.Sc. in Mathematics**, The Hebrew University of Jerusalem *2015–2019*
Magna Cum Laude, Amirim Honors Program.
Thesis: *Stress potentials in nonlinear incompatible elasticity.*
Advisor: Prof. Raz Kupferman.

Honors, Awards and Grants

- **Azrieli Graduate Fellowship**, a highly competitive Ph.D. fellowship. *2022–present*

- **SLMath (MSRI) Reimbursement**, *New Frontiers in Curvature*. *2024*

- **Gordon Scholarship**, monetary research award. *2024*

- **Oberwolfach Leibniz Graduate Student**, *Partial Differential Equations*. *2023*

- **Lior Tzafriri Memorial Prize**, for remarkable Ph.D. research in mathematics. *2023*

- **Israeli Mathematical Union Award**, for best Ph.D. student talk. *2022*

- **M.Sc. Excellence Scholarship**, increased stipend. *2019–2021*

- **Amirim Honors Program**, merit-based undergraduate fellowship. *2015–2019*

Publications and Preprints

1. **Roe Leder**, *The linearized Einstein equations with sources on compact Riemannian manifolds with boundary*, [arXiv:2510.12797](#), 2025.

2. **Roe Leder**, *Cohomology for linearized boundary-value problems on general Riemannian structures*, [arXiv:2504.18494](#), 2025.

3. Raz Kupferman, **Roe Leder**, *Elliptic pre-complexes, Hodge-like decompositions and overdetermined boundary-value problems*, Forum Math. Sigma **13** (2025), e51.
4. Raz Kupferman, **Roe Leder**, *Double forms: Regular elliptic bilaplacian operators*, J. Anal. Math. **153** (2024), 683–758.
5. Raz Kupferman, **Roe Leder**, *On Saint-Venant compatibility and stress potentials in manifolds with boundary and constant sectional curvature*, SIAM J. Math. Anal. **54** (4) (2022), 4625–4657.
6. **Roe Leder**, *Cohomology for curvature* (in preparation).

Conference Talks, Seminars, and Colloquia

- **Generalized Hodge theory for geometric problems**
GAFAP seminar, Weizmann Institute of Science, Israel. 2025
- **Hodge-like theory for geometric overdetermined boundary-value problems**
Microlocal and Global Analysis Conference, University of Potsdam, Germany. 2025
Analysis Seminar, Hebrew University of Jerusalem, Israel. 2025
- **Elliptic pre-complexes, Hodge-like decompositions and overdetermined BVPs**
Geometric Analysis and Topology Seminar, NYU Courant Institute, USA. 2024
Analysis Seminar, Tel Aviv University, Israel. 2024
Analysis Seminar, Weizmann Institute of Science, Israel. 2024
Colloquium (Lior Tzafriri Memorial Lecture), Hebrew University of Jerusalem, Israel. 2023
- **Compatibility and stress potentials in non-Euclidean elasticity**
IRP Conference: From Non-Equilibrium to Turbulence and Soft Matter, Nice, France. 2023
- **From breaking spaghetti to swimming robots: Math in the service of mechanics**
Azrieli Graduate Studies Fellows Forum, Tel Aviv, Israel. 2022
- **Saint-Venant compatibility in Riemannian manifolds with boundary**
“Surfaces” Interdisciplinary Summer School, Frauenwörth Island, Germany. 2022
Israeli Mathematical Union Annual Meeting, Ben-Gurion University of the Negev, Israel. 2022
- **Geometric theory of shape deformations in strongly confined sheets**
Annual Meeting of the Israeli Physics Society, Ben-Gurion University of the Negev, Israel. 2022
- **Generalized stress potentials in nonlinear incompatible elasticity**
SIAM Mathematical Aspects of Materials Science, Bilbao, Spain (virtual). 2021
Analysis Seminar, Hebrew University of Jerusalem, Israel. 2021
- **Integrable systems and applications to non-Euclidean elasticity**
Nonlinear Group Seminar, Hebrew University of Jerusalem, Israel. 2020
- **Stress potentials in incompatible elasticity**
Amirim Seminar, Hebrew University of Jerusalem, Israel. 2019
Nonlinear Group Seminar, Hebrew University of Jerusalem, Israel. 2019

Teaching

- TA for *Fundamental Concepts in Functional Analysis*. 2025
Mandatory analysis graduate course, number 80600. Hebrew University.
- TA for *Fundamental Concepts in Spectral Analysis*. 2021–2022, 2024–2025
Mandatory analysis graduate course, number 80601. Hebrew University.
- TA for *Fundamental Concepts in Differential Geometry*. 2022–2024
Mandatory geometry graduate course, number 80608. Hebrew University.
- TA for undergraduate mathematics courses. 2018–2024
Infinitesimal Calculus; Linear Algebra; Elementary Number Theory; Mathematical Methods (“*Math for Physicists*”), Hebrew University.