



Exponent®
Engineering & Scientific Consulting

Kirill Rebrov, Ph.D.

Associate | Mechanical Engineering

Houston

+1-832-325-5703 | krebrov@exponent.com

Professional Profile

Dr. Rebrov specializes in computational modeling, simulation, and optimization for problems involving continuum (solid, fluid, fracture) mechanics and thermodynamics. He has 3.5 years of industrial experience in technical consulting, primarily for engineering applications in the energy sector. Previously, his graduate research work focused on complex coupled chemo-thermo-mechanical phenomena, with background in applied and computational mechanics and mathematics.

Dr. Rebrov has provided expert support and project management for projects spanning the oil and gas industry (Upstream, Midstream, Downstream), often in collaboration with materials and testing teams, across multiple technical areas. His multi-disciplinary work involves finite element analysis (FEA), computational fluid dynamics (CFD) analysis, and engineering criticality assessment (ECA) for fitness-for-service (FFS) assessments, global structural analysis (GSA), and root cause failure analysis of various structures and components including pipelines, pressure vessels and heat exchangers, pumps, valves, frac trees, offshore platforms and wind turbines, riser/umbilical systems, drill strings, packers, BOP stacks, stress joints, hang-off adaptors, load frames, anchors, crack arrestors and repair sleeves.

He is well versed in the application of regulatory and industry standards used throughout the oil and gas industry, including the ASME Boiler and Pressure Vessel Code (BPVC) for the design, fabrication, inspection, and fitness-for-service evaluation of pressure-retaining equipment; API 579-1/ASME FFS-1 for the assessment of equipment integrity and remaining life; API Recommended Practice 14E for the design and operation of offshore production systems and flowlines; and BS 7910 and DNV-RP-F108 for engineering criticality assessments, fracture mechanics evaluations, and the assessment of flaws in welded structures and pressure-containing equipment.

Academic Credentials & Professional Honors

Ph.D., Computational Sci, Eng, & Mathematics, University of Texas, Austin, 2022

M.S., Computational Sci, Eng, & Mathematics, University of Texas, Austin, 2019

B.S., Aerospace Engineering, University of Texas, Austin, 2016

Prior Experience

Stress Engineering Services, Inc. (SES), Houston, TX, Associate II (Jan 2026 - Jul 2026) and Associate (Jan 2023–Dec 2025)

Oden Institute, University of Texas at Austin, Austin, TX, Graduate Research Assistant (Aug 2016–Dec 2022) and Graduate Teaching Assistant (Aug 2018–Jul 2020)

Languages

Russian

Publications

Rebrov KR, Brewer J, Matta L, Farrow K, Wilson J. Characterization of stress amplification factors in steel and composite repair sleeves. Accepted technical talk for 2026 International Pipeline Conference & Expo (IPCE) and peer-reviewed paper for Proceedings of the 2026 16th International Pipeline Conference, Calgary, Alberta, Canada, September 21–25, 2026.

Rebrov KR, Wilson J, Baraniecki K. [Evaluation of composite crack arrestor design for running ductile fractures on high pressure pipelines](#). Proceedings of the 2024 15th International Pipeline Conference, vol. 2B: Pipeline and Facilities Integrity, Calgary, Alberta, Canada, September 23–27, 2024. V02BT03A020. ASME.

Liechti KM, Rebrov KR, Rodin GJ. [Analysis of thin layers with interphases](#). European Journal of Mechanics - A/Solids 2023; 100:104549.

Rebrov KR. [Coupled phenomena in thin layers](#). PhD Dissertation, University of Texas, Austin, 2022.

Movchan B, Rebrov KR, Rodin GJ. [Axisymmetric deformation of compressible, nearly incompressible, and incompressible thin layers between two rigid surfaces](#). International Journal of Solids and Structures 2021; 214–215:61–73.

Project Experience

FEA and ECA

- FEA and ECA for various structures (e.g. ASME BPVC), with both geometric and material non-linearities. These include API 579-1/ASME FFS-1 Level 3 FFS elastic-plastic FEA for plastic collapse, local failure, and buckling checks, as well as linear elastic fracture mechanics (LEFM)-based fatigue crack growth ECA per BS 7910 and DNV-RP-F108.

CFD

- CFD work related to process optimization, flow-induced failures, and equipment design, involving 3-D compressible turbulent multi-phase flow characterization, conjugate heat transfer analysis, erosion/corrosion assessment (via empirical models or API RP 14E), and electro-chemical reaction kinetics.

Multiphysics coupled phenomena:

- Multiphysics modeling and simulation of various mass and heat transport phenomena, sequentially-coupled CFD-FEA, and two-way-coupled fluid-solid interaction (FSI) analysis.

Additional Contributions

- Beyond project work, Dr. Rebrov contributes to in-house research efforts, software development, and optimization of pre-/post- processing workflows.

Outreach

- Dr. Rebrov is active in outreach activities and recruiting efforts, giving invited guest lectures on CFD to Aerospace Engineering students at University of Houston, as well as attending various industry (ASME, SPE, and IADC) and university (UT Austin Career Fair) networking events.

Research Experience

- Prior to joining industry, Dr. Rebrov's graduate research work focused on mathematical modeling and numerical simulation of complex coupled phenomena in thin multi-layers. His work involved a multi-disciplinary interplay of continuum (solid, fluid, fracture/damage, and micro-) mechanics, thermodynamics, coupled chemo/poro-thermo-mechanical phenomena, interfacial adhesion phenomena, applied mathematics (asymptotic methods), hp-FEA, numerical analysis and scientific computing.
- His dissertation was part of a collaborative effort, between academic and industrial partners in Europe and the U.S., which aimed to optimize design of high-speed machining processes for applications involving difficult-to-machine advanced materials. His work motivated experiments by research groups in materials science, solid-state diffusion, and experimental mechanics.