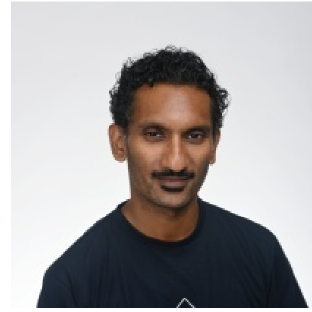
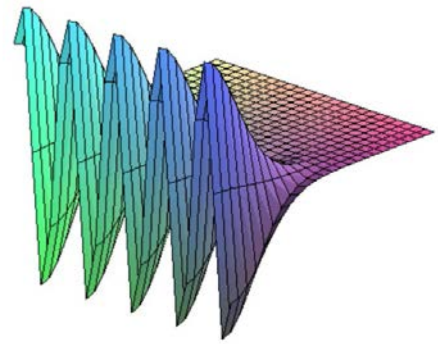
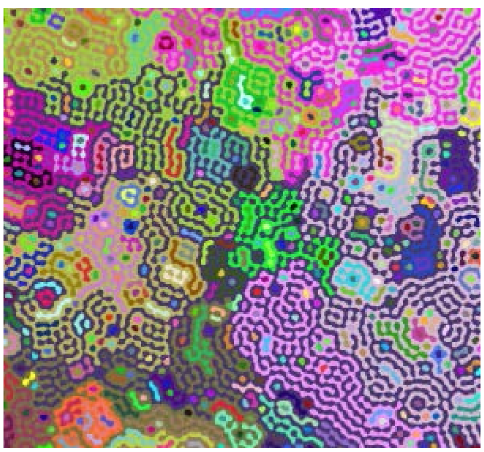
Suresh Eswarathasan

Analysis





Microtonal Analysis: The main thrust of Dr. Eswarathasan's research in the last few years has been to apply techniques from microlocal analysis to spectral problems in quantum mechanics. Microlocal analysis is essentially the study of partial differential equations through the lens of symplectic geometry and Fourier analysis; this combination of techniques often being referred to as ”phase space analysis”. This methodology has proven to be a powerful unified approach to a number of problems in analysis, from partial differential equations to integral geometry and inverse problems.



Eigenfunctions: Dr. Eswarathhasan's focus has been on different aspects of eigenfunctions, which are fundamental objects that sit at the crossroads of seemingly distinct parts of mathematics like partial differential equations and number theory. Eigenfunctions arise in physics as modes of periodic vibrations of drums and membranes. They also represent the bound states of a free quantum particle on certain closed shapes in space; for example, the well-known spherical harmonics on the 2-sphere model the angular momenta orbitals of an electron in a hydrogen atom. Furthermore, eigenfunctions of the Laplacian are the basis for the separation of variables which in turn give solutions to the wave equation, heat equation, and time-dependent Schrödinger equation. Whilst eigenfunctions have been studied for centuries, current research also tries to understand the beautiful interaction between dynamics/geometry and their behavior.

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