1145-46-2513 **Edward Voskanian*** (voskanian@math.ucr.edu), 7020 Estepa Drive, Tujunga, CA 91042.
Mathematical Diffraction and the Complex Roots of a Nonlattice Dirichlet Polynomial. Preliminary report.

The discovery of quasicrystals established a new theory of solid state physics, and motivated by the desire to model these new structures also gave rise to the theory of mathematical quasicrystals. The set of complex roots of a nonlattice Dirichlet polynomial are approximated by the roots of a sequence of lattice Dirichlet polynomials determined by a sequence of simultaneous Diophantine approximations. This procedure, developed by Lapidus and van Frankenhuijsen, shows that the complex roots of a nonlattice Dirichlet polynomial have a quasiperiodic structure. The paper "Model Sets: A Survey" by Robert V. Moody suggests that aperiodicity and diffractivity are among the properties considered representative of mathematical quasicrystals, a term not universally defined. In this paper we give a survey of an open problem stated by Lapidus and van Frankenhuijsen asking if the set of complex roots of a nonlattice Dirichlet polynomial can be understood in terms of a suitable generalized mathematical quasicrystal. And, using a measure theoretic idealization of kinematic diffraction developed by A. Hof, a formula for the diffraction measure of a lattice Dirichlet polynomial satisfying a kind of regularity condition is given. (Received September 25, 2018)