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Edward Voskanian* (evosk001@ucr.edu), 7020 Estepa Dr, Tujunga, CA 91042. *On the Quasiperiodic Structure of the Complex Roots of a Nonlattice Dirichlet Polynomial*. Preliminary report.

In the book "Fractal Geometry, Complex Dimensions and Zeta Functions", by Michel L. Lapidus and Machiel van Frankenhuysen, there is an open problem asking if there is a natural way in which the quasiperiodic pattern of the complex roots of a nonlattice Dirichlet polynomial can be understood in terms of a suitable generalized quasicrystal. We approximate the roots of a given nonlattice Dirichlet polynomial using an explicit procedure developed by Lapidus and van Frankenhuysen, allowing one to see the emergence of a quasiperiodic pattern. To use this procedure, we need a way to find good simultaneous Diophantine approximations, and a way to approximate the roots of a polynomial of very high degree. As suggested by Lapidus and van Frankenhuysen, we have implemented the original LLL algorithm to obtain good simultaneous Diophantine approximations. And we use a suitable QR algorithm for companion matrices to approximate the roots of a polynomial of very high degree. We also address Conjecture 4.1 from the paper "On the Complex Dimensions of Nonlattice Fractal Strings in Connection with Dirichlet Polynomials", by J.M. Sepulcre and E. Dubon, and provide more numerical evidence to support this conjecture. (Received September 27, 2017)