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The Genus Polynomials of Cubic Graphs

Given a graph G, its genus distribution is the sequence $\{a_g\}_{g\geq 0}$, where a_g is the number of 2-cell embeddings of G in the oriented surface of genus g. The genus polynomial of G is defined similarly to be $\sum_{g\geq 0} a_g x^g$. The Log-Concavity Conjecture, which has been open for more than 30 years, states that the genus polynomial of every graph is log-concave. It was further conjectured by Stahl that the genus polynomial of every graph has only real roots, however this was later disproved. In this talk, we examine the genus polynomials of cubic graphs and the distribution of their roots. We present some cubic graphs whose genus polynomials have complex roots and explore the difficulty in using the roots of these polynomials to determine whether they are log-concave.