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Anil Venkatesh* (anilvenkatesh@ferris.edu). *Pythagoras to Secor: Improving the Miracle Temperament.*

In music theory, a temperament is a system of tuning. The concept of temperament has been studied since antiquity; it arises as a consequence of the unique factorization property of integers, applied to the pitches of musical notes.

In this talk, we briefly review historically significant temperaments such as Pythagorean tuning and 12-tone equal temperament. We then introduce George Secor's "miracle temperament." Discovered in 1974, the miracle temperament produces highly harmonious intervals compared to traditional tunings. In fact, it is considered by music theorists to be the best approximation of the first eleven overtones. Last year, we presented a new temperament with better approximations of these intervals than the miracle temperament. In this talk, we extend last year's result with an analysis of the space of all temperaments. Our main result is an algorithm that fully categorizes all miracle-like temperaments in this space. (Received September 20, 2016)