1089-52-336 **Kurt M Anstreicher*** (kurt-anstreicher@uiowa.edu), C120 PBB, Iowa City, IA 52242. *An Approach to the Dodecahedral Conjecture Based on Bounds for Spherical Codes.*

The dodecahedral conjecture states that in a packing of unit spheres in $\Re^3$, the Voronoi cell of minimum possible volume is a regular dodecahedron with inradius one. The conjecture was made by Fejes Toth in 1943, and proved by Hales and McLaughlin in 1998 using techniques developed by Hales for his proof of the Kepler conjecture. The proof of Hales and McLauughlin, while apparently correct, is difficult to verify due to the many cases and extensive computations required. In his 1964 book *Regular Figures*, Fejes Toth suggested a proof scheme for the dodecahedral conjecture but was unable to verify a key inequality. Recent work of Hales uses this same inequality as the basis for a new proof of the Kepler conjecture. We describe an approach for proving Fejes Toth's inequality that uses strengthened semidefinite programming bounds for spherical codes. (Received February 18, 2013)