1154-52-2403 **Nina Zubrilina*** (nizubrilina@gmail.com). *Zeros of Optimal Functions in the Cohn-Elkies Linear Program.*

In a recent breakthrough, Viazovska and Cohn, Kumar, Miller, Radchenko, Viazovska solved the sphere packing problem in $\mathbb{R}^8$ and $\mathbb{R}^{24}$, respectively, by exhibiting explicit optimal functions, arising from the theory of weakly modular forms, for the Cohn-Elkies linear program in those dimensions. These functions have roots exactly at the lengths of points of the corresponding optimal lattices: $\{\sqrt{2n}\}_{n\geq 1}$ for the E_8 lattice, and $\{\sqrt{2n}\}_{n\geq 2}$, for the Leech lattice. The constructions of these optimal functions are in part motivated by the locations of the zeros. But what are the roots of optimal functions in other dimensions? We prove that distances between root lengths are bounded from above for $n \geq 1$ and not bounded from below for $n \geq 2$. We further prove that the root lengths have to be arbitrarily close for arbitrarily long, that is, for any $C, \varepsilon > 0$, there is an interval of length C on which the root lengths are at most ε apart. Finally, we establish a technique that allows one to improve a non-optimal function in some cases. (Received September 17, 2019)