1154-65-2350 **Tiffany N Jones*** (tnjones@math.arizona.edu), Department of Mathematics, The University of Arizona, 617 N. Santa Rita Ave., Tucson, AZ 85721-0089. *Solving highly oscillatory wave equations with an asymptotically stable dual-scale compact method.*

A dual-scale numerical algorithm for solving highly oscillatory Helmholtz equations in polar coordinates is presented and analyzed. Decomposing the axisymmetric radial domain and associated governing equations provides the potential for optical computations via interconnected micro and macro domains. These coupled equations are subsequently discretized utilizing a compact strategy for increased efficiency and high radial accuracy.

With a focus on highly oscillatory solution features, a rigorous analysis of the numerical method showed it to be asymptotically stable at high wavenumbers, supporting the algorithmic effectiveness and reliability. Furthermore, spectral norm analysis of the amplification matrices reveals necessary constraints for conventional stability. Numerical self-focusing beam propagation simulations, including those conducted with a range domain scaling factors, reinforce these findings. (Received September 17, 2019)