

Figure 4: MUSIC pseudo spectrum and roots found with root-MUSIC for $\theta_1 = -45^\circ$ and $\theta_2 = 50^\circ$

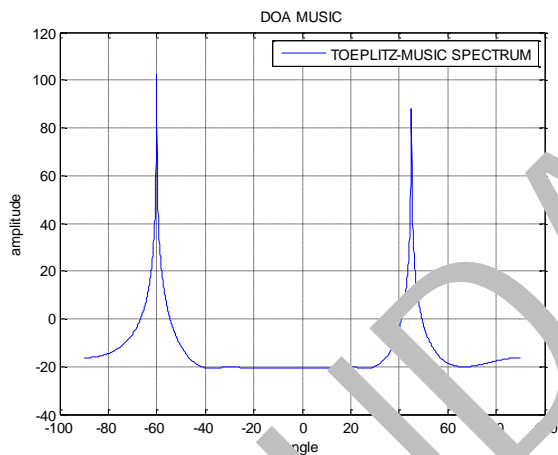


Figure 5: MUSIC pseudo spectrum found with Toeplitz-MUSIC for $\theta_1 = -45^\circ$ and $\theta_2 = 50^\circ$

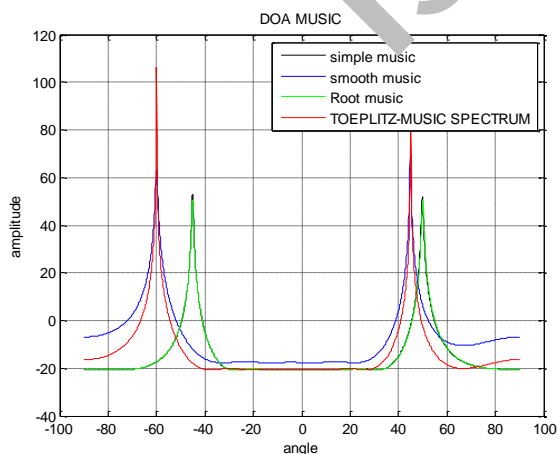


Figure 6: Comparative MUSIC pseudo spectrum for different algorithms

V. CONCLUSION

The MUSIC algorithm has greater resolution and accuracy than the other algorithms (i.e. Bartlett,

CAPON) and hence they are being investigated much in detail in much literature. The results show the performance of simple MUSIC, root MUSIC and toeplitz music is better than smooth music. The performance can be improved with more elements in the array, with higher number of snapshots of signals and greater angular separation between the signals. These are responsible for the form of sharper peaks in MUSIC spectrum and smaller errors in angle detection.

REFERENCES

- [1] R. K. Jain, Sumit Katiyar and N. K. Agrawal, "Smart Antenna for Cellular Mobile Communication" VSRD International Journal of Electrical, Vol. 1, No. 9, PP. 540-541, 2011.
- [2] S. B. Lante, V. K. Kokate & A. M. Sapkal, "Performance Analysis of MUSIC and ESPRIT DOA Estimation Algorithms for Adaptive Array Smart Antenna in Mobile Communication", International Journal of Computer Networks (IJCN), Vol. 2, Issue 3, PP. 152-158, 2010.
- [3] E. M. Al-Azami, R. M. Shubair, and M. E. Al-Mulla, "Computationally Efficient DOA Estimation in a Multipath Environment Using Covariance Differencing and Iterative Spatial Smoothing," IEEE, 2015.
- [4] Kung S Y, Lo C K, Foka R. "A toeplitz approximation approach to coherent source direction finding," IEEE international conference ICASSP-86, vol. 11, pp. 193-196, 1986.
- [5] Qing Wang, Hua Chen, Guohuang Zhao, Bin Chen and Pichao Wang, "An Improved Direction Finding Algorithm Based on Toeplitz Approximation", Sensors, ISSN: 1424-8220, 2013.
- [6] Porat B., Friedlander B., "Direction finding algorithms based on high-order statistics", IEEE Trans. Signal Process. 1991, 39, 2016-2024.
- [7] J. G. Arceo-Olague, D. H. Covarrubias-Rosales, J. M. Luna-Rivera, A. Angeles-Valencia, "Efficient Adaptive Algorithms for DOA Estimation in Wireless Communications", International Journal of Communications Network and System Sciences, 173-176, 2010.