

INTERPRETATION OF LUNAR AND PLANETARY ELECTROMAGNETIC SCATTERING USING THE FULL WAVE SOLUTIONS; E. Bahar and M. Haugland, Department of Electrical Engineering, University of Nebraska, Lincoln, NE 68588-0511

Bistatic radar experiments carried out during the Apollo 14, 15 and 16 missions provide a very useful dataset with which to compare theoretical models and experimental data. Vesecky, et al.[1] report that their model for near grazing angles compares favorably with experimental data. However, for angles of incidence around 80° , all the analytical models considered by Vesecky, et al.[1] predict values for the quasi-specular cross sections that are about half the corresponding values taken from the Apollo 16 data. (See Fig. 1) In this work, questions raised by this discrepancy between the reported analytical and experimental results are addressed. The unified full wave solutions are shown to be in good agreement with the bistatic radar taken during Apollo 14 and 16 missions. (See Fig. 1) Using the full wave approach, the quasi-specular contributions to the scattered field from the large scale surface roughness as well as the diffuse Bragg-like scattering from the small scale surface roughness are accounted for in a unified self-consistent manner. Since the full wave computer codes for the scattering cross sections contain ground truth data only, it is shown how it can be reliably used to predict the rough surface parameters of planets based on the measured data.

[1] Vesky, J.F., Sperley, E.J., and, Zebker, H., "Electromagnetic Wave Scattering at Near-Grazing Incidence from a Gently Undulating, Rough Surface," Proceedings of IGARSS'88 Symposium, Edinburgh, Scotland, Ref ESA SP-284 (IEEE 88CH2497-6), Vol. 3, pp 1579-1583, September 13-16, 1988.

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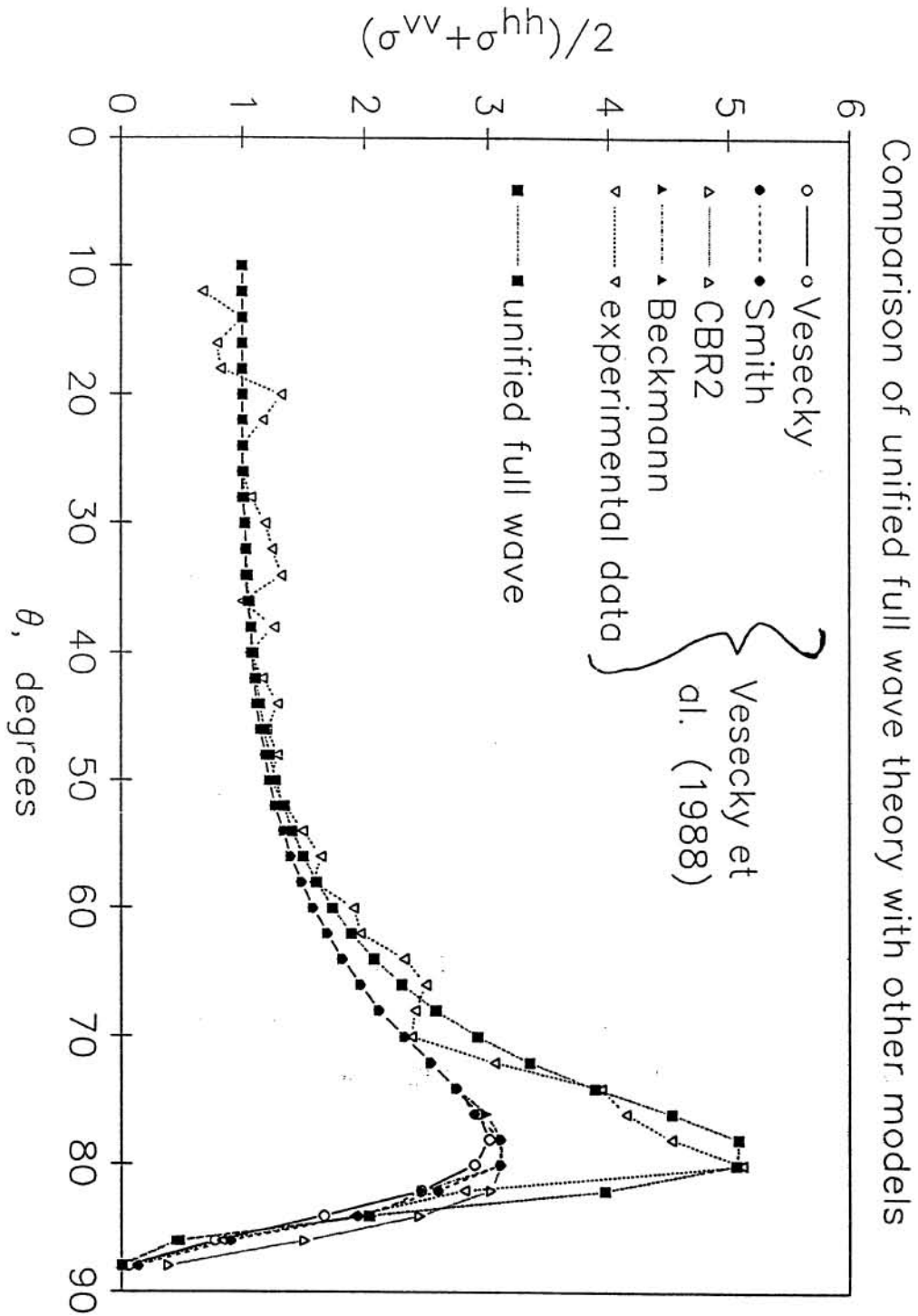


Fig 1 Comparison of the unified full wave solution with other models.