Abstract

Phase/time/path difference (PTPD) methods of Esteva [1977] and Borgman [1974] with two modifications, viz., true phase and coherence proposed in this thesis, have for the first time been successfully used for computing wave direction as a function of frequency from actual field measurements at the Coastal Engineering Research Center's (CERC) Field Research Facility at Duck, North Carolina, USA, using polygonal and linear arrays respectively in case of swell, sea and surf beat as the directional spread is generally unimodal. PTPD methods fail in case of multimodal directional spreads, which can be easily spotted from the large value of the standard deviation of redundant estimates of wave direction. In this thesis it is shown that PTPD methods are adept in describing the propagation of waves generated by distant storms (swell); locally generated wind waves (sea); infra gravity waves (surf beat) locally generated by energetic incident swell; and surf beat of remote origin occurring when low swell energies are present. Results of PTPD methods are consistent with those obtained by the CERC using the Iterative Maximum Likelihood Estimation (IMLE) method.