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Quazi

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[54] METHOD AND SYSTEM FOR PROCESSING ACOUSTIC SIGNALS

Attorney, Agent, or Firm—Michael J. McGowan; Prithvi C. Lall; Michael F. Oglo

[75] Inventor: Azizul H. Quazi, East Lyme, Conn.

### [57] ABSTRACT

[73] Assignee: The United States of America as represented by the Secretary of the Navy

A method for processing acoustic signals received by first and second underwater detectors, spaced from each other, for detection and determination of range and bearing of an underwater signal source, includes the steps of obtaining a time series  $x_d$  of first random variables  $X$  from the first detector, obtaining a time series  $y_d$  of second random variables  $Y$  from the second detector, and providing a window of a selected number of digital points of time series  $x_d$  and  $y_d$ . The method further includes determining distribution of  $p(x,y)$ ,  $p(x)$ , and  $p(y)$ , wherein  $p(x,y)$ =joint distribution,  $p(x)$ =distribution of  $x$ , and  $p(y)$ =distribution of  $y$ , and estimating mutual information  $I(X;Y)$  of the random variables  $X,Y$  whereby to obtain a measure of dependence between the random variables  $X$  and  $Y$  in the window, whereby to determine whether  $x_d$  and  $y_d$  come from a single source, and if  $x_d$  and  $y_d$  are determined to have come from the same source, computing time differential in receipt of the  $X$  and  $Y$  signals by the first and second spaced detectors to provide the range and bearing of the source from the first and second detectors. The invention further relates to a system for performing the steps of the above method.

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### Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 677,205, Jul. 9, 1996, Pat. No. 5,668,778.

[51] Int. Cl.<sup>6</sup> ..... G01S 3/80; H04B 11/00

[52] U.S. Cl. .... 367/124; 367/131

[58] Field of Search ..... 367/99, 118, 124, 367/131; 364/421

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2 Claims, 8 Drawing Sheets

