



XI Congresso Brasileiro de Física Médica

<http://www.abfm.org.br/rp2006/index.asp>

14 a 17 de Junho de 2006 - Ribeirão Preto - SP

Performance Testing of Medical Ultrasound Systems

James A. Zagzebski
Department of Medical Physics
University of Wisconsin, Madison WI USA

Modern ultrasound imaging machines utilize array transducers that are interfaced to digital hardware for beam forming and signal processing. Although international standards exist for measuring and displaying acoustic intensity and power levels of these machines, there is little or no consensus on methods for measuring image performance and for routine quality assurance.

The purpose of this presentation is to review current and emerging methods for measuring performance and for QA testing of ultrasound machines. Tissue mimicking phantoms for assessing gray scale and spatial resolution will be described, and a brief overview will be given of their use. The output image of most systems is in digital format, so possibilities of using computerized image analysis to remove subjectivity in performance testing exist. Several available algorithms for computerized analysis of phantom images will be presented.

This presentation also will describe activities of the International Electrotechnical Commission and of professional bodies in the US in the area of ultrasound equipment performance testing. IEC has a draft standard for testing geometric accuracy and a number of proposals for determining sensitivity, dynamic range, and low contrast detectability. In addition, the American College of Radiology requires routine QA testing of machines in ultrasound laboratories that receive accreditation for their practice, and the American Institute of Ultrasound in Medicine is publishing a set of guidelines called "QA in the Clinic." Quality assurance protocols generally recognize that array transducers are most subject to fluctuations over time because of reduced sensitivity or failure of individual elements and channels. A new electronic transducer testing apparatus developed to evaluate element failure will also be described.