BE12-H.23

A NUMERICAL APPROACH TO PROPAGATIONS OF NONLINEAR PULSE WAVES IN ARTERIES S.G. Wu*, Beijing Polytechnic Univ, Beijing, P.R.China, G.C. Lee, and X.S. Ma*, tate University of New York, Buffalo, NY

The present paper mainly deals with methods of numerical solutions for the problems of propagations of nonlinear arterial pulse waves. The artery is assumed to be a thin-walled vessel with the small tissue thickness, and its wall is locally orthognal, anisotropic, elastic and incompressible. In addition, the blood is modeled to be an incompressible Newtonian fluid with the axisymmetrical flow. In this numerical experimentation, the problem of propagations of nonlinear pulse waves in the aorta of a dog is studied, and the calculation is being performed in IBM-4381 computer. The complete numerical results are obtained, they involve solutions of propagations of the following nonlinear pulse waves: pressure, velocities and flowrate of the blood, as well displacements, velocities and stresses of the vessel wall. These results obtained are very useful to explain the mechanism of propagations of pulse waves in arteries.

BE12-I.1

Ultrasono-Tomography Using FM Chirp Pulse Compression Technique, T.Moriya*,S.Kiryu,H.Matsukawa,T.Fuse, Y.Tanahashi+, Tokyo Metropol. Univ., 1-1,Fukazawa 2-Chome, Setagaya-ku, Tokyo,158,Japan , +Tohoku Univ.

To improve resolution of ultrasonotomography and to remove bioeffects due to the peak intensity of the ultrasonic pulse, we devised a scanning system incorporating FM chirp pulse compression technique.
The B-mode images for tissue mimicking fantoms and abdominal B-mode images are obtained using the system and compared with those obtained using the conventional pulse method.
We have found that (1) the images obtained by this method are similiar to those obtained by the conventional pulse method,when the center frequency of the chirp signal from the region of interest is the same with the center frequency of the pulse signal from the same region,(2) without changing the transducer, we obtain the B-mode images with higher lateral resolution only by shifting the center frequency of the chirp signal to the higher frequency.

BE12-I.2

The Acoustic Radiometer Measured Ultrasonic Therapeutic Instrument Jin Shuwu*, Zhejiang University Hangzhou,China

According to acoustic radiated force theory and Shotton's method,a new type of acoustic radiometer with float tethered chians for measuring output mean sound power from the ultrasonic therapeutic instrumentations and others ultrasonic equipments is developed. The basic priciple,construction design, sesitivity calibrated and measured method are described and remakable advantage of the radiometer is introduced,too.
The reflected target with air backing in diameter 6.1cm has the reflected coefficient 99.9%.The vernier gauge and the optical readout system used for measuring displacements by acousitic radiated force.
Nine errors of the radiometer is analysed. The measured repeatability error for confidence level 99.7% is better than 2.3%. The sensitivity constant in 0.5-10watts measured range is 10.90mm/W.

BE12-I.3

Experiments for a new quantitative reflection imaging, Jian-Yu Lu and Yu Wei*, Dept. of Biomedical Engineering, Nanjing Institute of Technology, Nanjing, China

A new quantitative reflection imaging method which reconstructs the sound speed distributions of biological soft-tissues using the outline information and the phases of rf echo signals on these outlines provided by commercial B-scanner has been developed by the authors recently*. This paper reports the experiment studies for image reconstructions using the method introduced above.
The rf echo signals are acquired from the commercial Japanese B-scanner SSD-256 using the waveform-storage oscilloscope HP-1980B with a sampling rate as high as 30 MHz. An interface between the B-scanner and the oscilloscope was specially designed to eliminate a random waveform shock caused by big time-delay of the waveform from trigger. The signals sampled are transferred to IBM-PC computer using IEEE-488 parallel interface for image reconstructions. Several agar phantoms were prepared and were put into an echoless tanker for experiments. Compared to the images displayed on the screen of the B-scanner, the images reconstructed are more helpful in the understanding of the structures of the test objects.

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