



menu

search

Go

BME Webmaster
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Thursday 14:30 - 15:30

B.Sc 1968 Electrical Engineering, Technion-IIT

M.Sc. 1973 Electrical Engineering, Technion-IIT

D.Sc. 1977 Biomedical Engineering, Technion-IIT

Field of research:

Signal and image processing; Diagnostic and Therapeutic Ultrasound and applications, the Cardiovascular system; Potential Maps analysis

Research interests:

- Biological signal processing, analysis and modeling of physiological systems and processes, with special emphasis on the cardiovascular system
- Signal and image processing related to ultrasound tissue studies and Doppler information
- [Special implementations of ultrasound](#)

Research focus:

Measurement, Signal & Image Processing of Ultrasound (& Doppler) data:

? Development of signal processing tools and measurement procedures of ultrasound signals for modifying apodization parameters (e.g. by Sub Aperture Receiver technique), for reduced speckle noise and tissue characterisation.

? Development of measurement methods and processing of signals and images (2 dimensional and 3 dimensional) of blood flow and flow velocity, using Doppler ultrasound technology (continuation of a R&D project which was initiated together with the Division of Computer Research and Technology - National Institutes of Health (NIH).

? Development of tracking of tissue in ultrasound images and of parameters which allow description of strain development in the myocardium. Development of new ?strain imaging? process that provides the myocardial activation sequence.

? Development of signal processing methods for detecting reverberations of ultrasound contrast agents (gas bubbles) for perfusion measurements and pressure measurements.

? Study of ultrasound contrast agents? properties as intra-organ blood pressure gauge, specifically of coated microbubbles with various mechanical properties.

? Development of a method for producing non-invasively localized cavitation and localized hyperthermia and ablation.

? Study of ultrasound methods for estimating tissue changes caused by laser, RF or ultrasound localized heating, for the control of thermo-therapy of cancerous tissue.

Bioelectrical processes, phenomena and their measurements:

? The myocyte electrical activity - study and development of models of the myocyte action potential, its propagation from cell to cell and in 2 dimensional and 3 dimensional non-isotropic tissue, and the study of arrhythmia generation (mechanisms - automaticity, reentry; geometry and anisotropy); Mechanical - Electrical feedback - testing a new hypothesis of arrhythmogenesis.

? Electrical Impedances - total thorax impedance measurement as a non-invasive tool of volume changes assessment (lung volume changes, Left Ventricular filling / stroke volume estimation).

? Electrical Impedance Tomography - construction of a double array, of electrical electrodes and

magnetic sensors, for acquisition of structural or functional cross-sectional images.
? Potential Mapping - design and construction (hardware and software) of a prototype for Body Surface Potential Mapping, using the Adam/Witznudel/Gilat method; Development of an analytical method for measurement of endocardial (and epicardial) potential maps.

Professional affiliations:

Council member, the European Alliance for Medical and Biological Engineering and Science (EAMBES) (2004-2005).

Member, Educational task force, the European Alliance for Medical and Biological Engineering and Science (EAMBES) (2003-2004).

Chair-Elect, Educational Division, the European Alliance for Medical and Biological Engineering and Science (EAMBES) (2005-2006).

Chair, Educational Committee, the International Federation for Medical and Biological Engineering (IFMBE) (2003-2005).

President and Member of the Board, Israel Society for Medical and Biomedical Engineering (elected, 2001- present).

Member (elected, at large) of Administrative Committee, IEEE Engineering in Medicine and Biology Society, (1999-2002).

Member of the Board of Directors of the International Conference of Computers in Cardiology (elected, 1990-1999).

Organizing, chairing and hosting the 1989 Computers in Cardiology conference in Israel (Jerusalem, September 19-22, 1989).

Associate Editor and member of the Editorial Board ? the IEEE Transactions on Biomedical Engineering.

Associate Editor and member of the Editorial Board ? Pattern Analysis and Applications (1998-2000).

Associate Editor and member of the Editorial Board ? the IEEE Book Series in BME published by the IEEE Press and sponsored by the IEEE EMBS (1999-2001).

Reviewer and Referee of various peer-review journals.

Member of the International Scientific Committee and Paper Reviewer of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society (1991- 2003).

Editorial responsibilities:

- **Associate Editor** and member of the Editorial Board ? the IEEE Transactions on Biomedical Engineering.
- **Associate Editor** and member of the Editorial Board ? Pattern Analysis and Applications (1998-2000).
- **Associate Editor** and member of the Editorial Board ? the IEEE Book Series in BME published by the IEEE Press and sponsored by the IEEE EMBS (1999-2001).

Selected publications:

- Adam, D.: Propagation of depolarization and repolarization processes in the myocardium - an anisotropic model. IEEE Trans. Biomed. Eng. V. 38(2):133-141, 1991.
- Vitsnudel, I. and Adam, D.: Level-crossing approach to the compression of body surface potential

- maps. J. of Visual Comm. and Image Rep. 2(2):188-198, 1991.
- Adam, D. and Glukhovsky, A.: Comparison between single signed integral pulse frequency and sine wave crossing modulation techniques. Biol. Cybernetics 64:469-475, 1991.
 - Gilat, S. and Adam, D.: Conservation and characterization of spatial features in a new method of data compression for body surface potential maps. Med. and Biol. Eng. and Comput. 30:15-25, 1992.
 - Adam, D. and Gilat, S.: Classification of pathologies by reduced sequential potential maps. Med. and Biol. Eng. and Comput. 30:26-31, 1992.
 - Glukhovsky, A., Adam, D., Amitzur, G., and Sideman, S.: Estimation of $[Ca^{++}]$ ion transients and fluxes to and from the sarcoplasmic reticulum. Cellular Engineering, V.2(2):57-65, 1997.
 - Landesberg, G., Adam, D., Berlatzky, Y., and Akselrod, S.: [Step baroreflex response in awake patients undergoing carotid surgery: time- and frequency-domain analysis](#). Am. J. Physiol., Vol. 274, H1590-H1597, 1998.
 - Ravhon, R., Adam, D. and Zelmanovitch, L.: [Validation of Ultrasonic image boundary recognition in Abdominal Aortic Aneurysm](#). IEEE Trans. Med. Imag., vol. 20, pp. 751-763, 2001.
 - Adam, D.: Signal and Image Processing ? Synopsis. Haux R, Kulikowski C., Eds., Schattauer Verlagsgesellschaft mbH, Stuttgart, pp. 397-400, 2001.
 - Adam, D. and Michailovich, O.: [Blind deconvolution of ultrasound sequences using non-parametric local polynomial estimates of the pulse](#). IEEE Trans. Biomed. Eng., vol. 42 (2), pp. 118-131, 2002.
 - Levy, S. and Adam, D. Bresler Y.: [Electromagnetic impedance tomography \(EMIT\): a new method for impedance imaging](#). IEEE Trans. on Medical Imaging, Vol. 21, (6), pp. 676-687, June 2002.
 - Michailovich, O. and Adam, D.: [Shift-invariant, DWT-based ?projection? method for estimation of ultrasound pulse power spectrum](#). IEEE Trans. Ultrasonics, Ferroelectrics and Frequency Control, Vol. 49, (8), pp. 1060-1072, 2002.
 - Michailovich, O. and Adam, D.: [Robust estimation of ultrasound pulses using outlier resistant de-noising](#). IEEE Trans. Med. Imaging, Vol. 22 (3), pp. 368-381, 2003.
 - Michailovich, O. and Adam, D.: [A high-resolution technique for ultrasound harmonic imaging using sparse representations in Gabor frames](#). IEEE Trans. Med. Imaging, Vol. 21, (12), 1490-1503, 2002.
 - Behar, V., Adam, D. and Friedman, Z.: [A new method of spatial compounding imaging](#). Ultrasonics, Vol. 41, (5), pp. 377-384, 2003.
 - Behar, V., Adam, D. and Friedman, Z.: [A new method of ultrasound color flow mapping](#). Ultrasonics, Vol. 41, (5), pp. 385-395, 2003.
 - Michailovich, O. and Adam, D.: [Phase unwrapping for 2D blind deconvolution of ultrasound images](#). IEEE Trans. Med. Imaging, Vol. 23 (1), pp. 7-25, 2004.
 - Behar, V., Adam, D., Lysyansky, P. and Friedman, Z.: [The combined effect of nonlinear filtration and window size on the accuracy of tissue displacement estimation using detected echo signals](#). Ultrasonics, Vol. 41, (9), pp. 743-753, 2004.
 - Behar, V., Adam, D.: [Parameter optimization of pulse compression in ultrasound imaging systems with coded excitation](#). Ultrasonics, Vol 42, (10), pp. 1101-1109, 2004.
 - Behar, V., Adam, D., Lysyansky, P. and Friedman, Z.: [Improving motion estimation by accounting for local image distortion](#). Ultrasonics, Vol. 43, (1), pp. 57-65, 2004.
 - Krasovitski, B., Kimmel, E., Sapunar, M. and Adam, D.: [Ultrasound attenuation of encapsulated microbubbles: time and pressure effects](#). Ultrasound in Med. & Biol., Vol. 30, (6), pp. 793-802, 2004
 - Razansky, D., Einziger, P.D. and Adam, D.: [Effectiveness of acoustic power dissipation in lossy layers](#), Journal of the Acoustical Society of America, Vol. 116, (1), pp. 84-89, 2004.
 - Razansky, D., Einziger, P.D., and Adam, D.: [Optimal Dispersion Relations for Enhanced](#)

[Electromagnetic Power Deposition in Dissipative Slabs](#). Physical Review Letters, Vol. 93, (8), pp. 902-1 - 902-4, 2004.

- Michailovich, O. and Adam, D.: [A novel approach to 2-D blind deconvolution of medical ultrasound images](#). In press, IEEE Trans. Med. Imaging.
- Adam, D., Sapunar, M. and Burla, E.: [On the relationship between encapsulated ultrasound contrast agent and pressure](#). Accepted to Ultrasound in Med. & Biol.
- Razansky, D., Einziger, P.D., and Adam, D.: [Broadband Absorption Spectroscopy via Excitation of Lossy Resonance Modes in Thin Films](#). Physical Review Letters, 95(1), 018101, Jul. 2005.
- Ganor, Y., Adam, D. and Kimmel, E.: Time and pressure dependence of acoustic signals radiated from microbubbles. Ultrasound in Med. & Biol., Vol. 31, (10), pp 1367-1374, 2005.
- Behar, V. and Adam, D.: Optimization of sparse synthetic transmit aperture imaging with coded excitation and frequency division. Ultrasonics, Vol. 43 (10), pp. 777-788, 2005.
- Razansky, D., Einziger, P.D., and Adam, D.: Enhanced Heat Deposition using Ultrasound Contrast Agent ? Modeling and Experimental Observations. IEEE Trans. Ultrason. Ferroelect. Freq. Contr., Vol. 53 (1), pp. 137-147, 2005.
- Adam, D., Beilin-Nissan, S., Friedman, Z. and Behar, V.: The combined effect of spatial compounding and nonlinear filtration on the speckle reduction in ultrasound images. Ultrasonics, Vol. 44 (1), pp. 166-181, 2006.
- Duvshani-Eshet, M., Adam, D. and Machluf, M.: The role of Optison in DNA delivery mediated by long-term therapeutic ultrasound application. Accepted by J. Cont. Rel.

[Back to Faculty list](#)