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FETAL ELECTROCARDIOGRAM MEASURING METHOD & EQUIPMENT (FEMME)

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The problem of detecting the fetal electrocardiogram (FECG) from a set of skin electrode signals has already received a lot of attention. Most of the proposed techniques are based on an analysis or processing of the measured waveforms. Other methods determine a set of weighting coefficients to be used in a linear, static combination of the measured signals.
Recent work showed the importance of the singular value decomposition (SVD) to solve this problem. The major advantage of this method is the simplicity and elegance of the concept, while reliable algorithms exist for its computation.

In the first part of this contribution we describe the development of a new SVD-based on-line algorithm to obtain the fetal electrocardiogram. Because of its very simple computational scheme, a real-time implementation is feasible. Moreover, several experiments on pregnant subjects have proven other very interesting features: (1) the capability to follow all time-variations in general and (2) the certainty that a source signal separation is realized, regardless of the fetal position. 1 , 2 .

The second part deals with the design of a measuring-system to perform real-time the FECG extraction from cutaneous recordings (the FEMME-project). This system will consist of a Personal Computer, extended with some modules for data acquisition (A/D and D/A conversion) and for data processing.

A prototype of the latter module, based on a TMS 32010 Texas Instruments microprocessor, has been realized and tested. The main emphasis here is on the ease-in-use for medical personnel of the equipment.

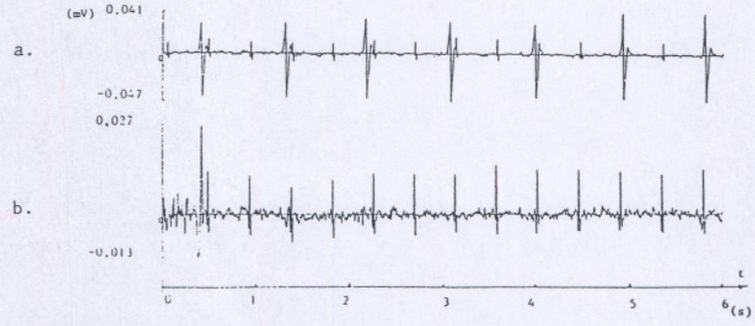


Fig.a. : One abdominal recording out of the measured set of signals
b. : One resulting signal showing the on-line processed FECG

References

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2. Callaerts,D., Vanderschoot,J., et al: An Adaptive On-line Method for the Extraction of the complete Fetal Electrocardiogram from Cutaneous Multilead Recordings. J. Perinatal Medicine. To be published.

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