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The Data Acquisition Method of The Sussex MK4 System

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Introduction of the Sussex MK4

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* 3D breast cancer detection system using EIT
* Current drive and voltage measurement
* The excitation current: 1mA peak to peak
* The voltage meter: 14-bit ADCs with input range of 5V peak to peak
* Operation frequency: 10 kHz, 20 kHz, 50 kHz, 100 kHz, 200 kHz, 500 kHz, 1 MHz, 2 MHz, 5 MHz

The Sussex MK4

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Fig.1 the Mk4 scanner, PXI, patient bed, saline and heating tank, and internal frame

Tank parameters

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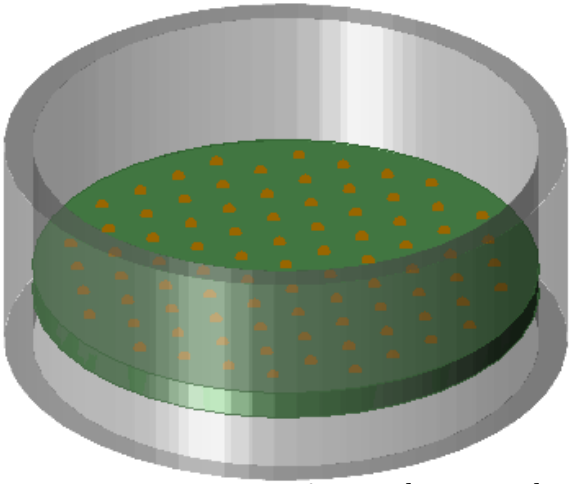
1) Diameter: 18 cm
2) Height: adjustable in vertical direction; Maximum: 5 cm
3) Maximum volume: 1250 ml corresponding to brassiere sizes 44C, 38E, 32G, 28H, etc.
4) Electrodes on the bottom, slightly recessed



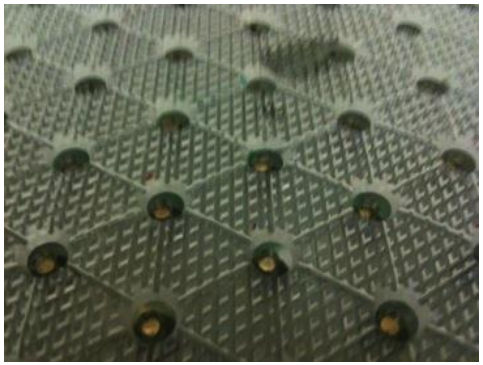


Fig.2 the tank and the planar electrode array

The process of examination

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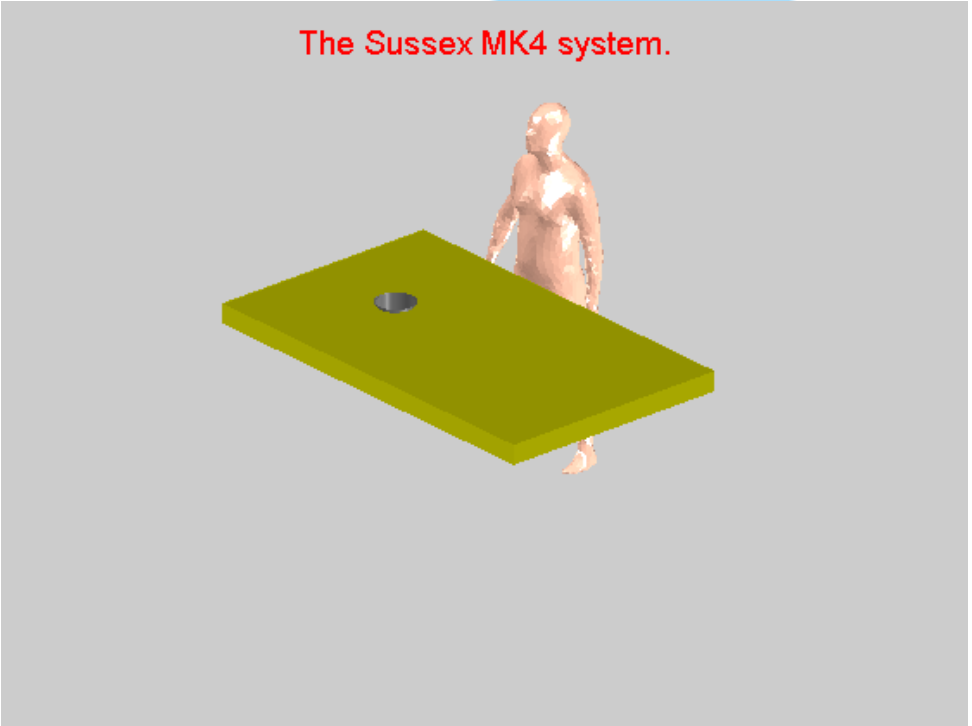
1) Fill the tank with body-temperature saline
2) Patient lies on the bed with a breast in the tank
3) Rise the electrode plane and press the breast into the chest to reduce the height of the breast
4) Data acquisition



The planar electrode array

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* 1) the number of the electrodes: 85
* 2) the adjacent electrode distance: 17cm
* 3) electrodes are deployed in a hexagonal pattern

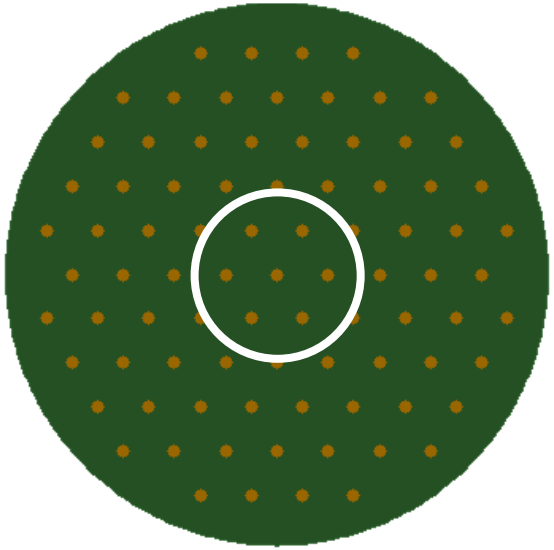

Fig.3 The hexagonal pattern of the electrode array

Data acquisition method

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* 1) small hexagonal measurement area scans the whole tank
* 2) three sample directions in each small hexagonal measurement
* 3) maximum 12 measurements in each excitation
* 4) 123 current excitations
* 5) 1416 voltage measurements

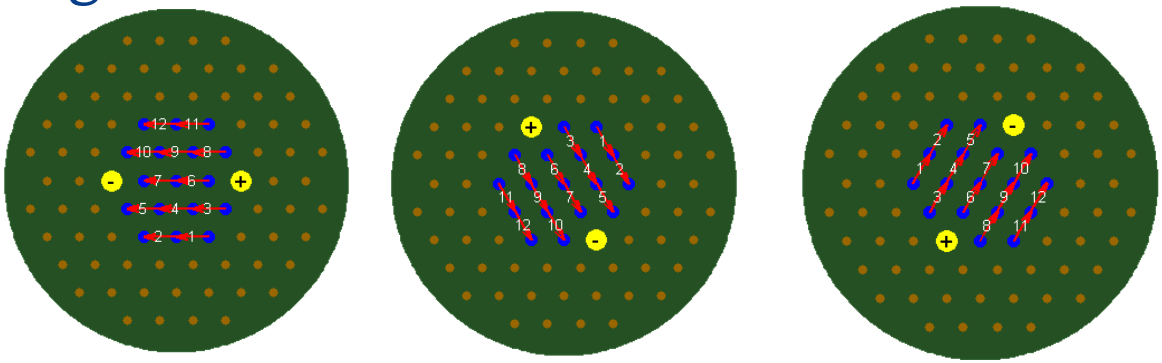

Fig.4 the current excitations and voltage measurements in a hexagonal measurement area

Display of the Data acquisition method

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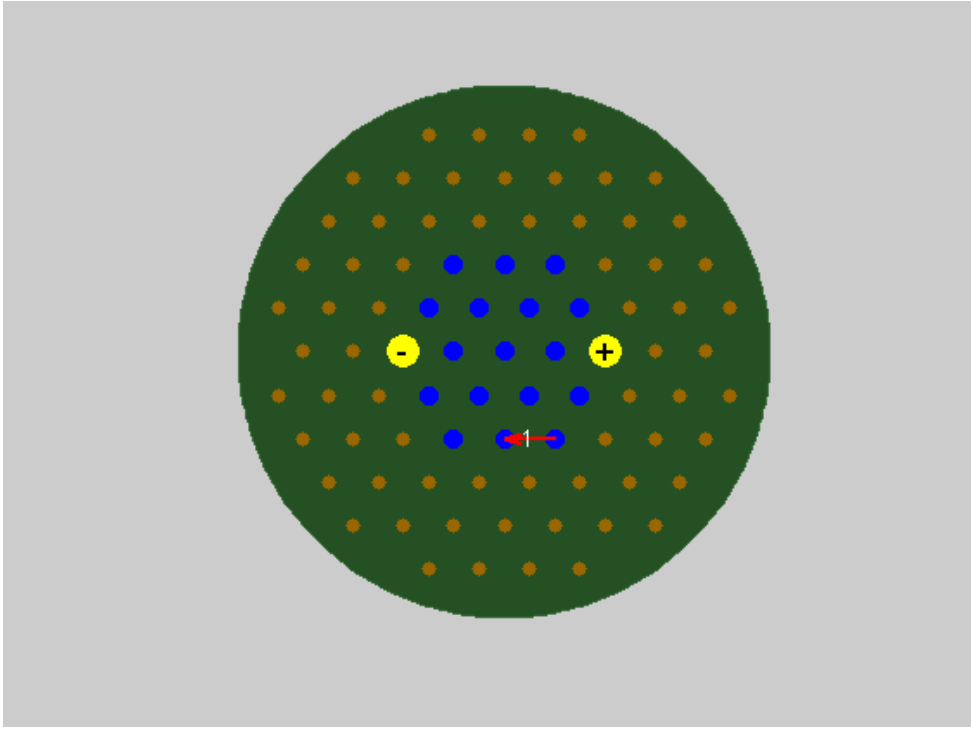

Reason for the hexagonal data acquisition method

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* 1) small dynamic range
* 2) good SNR

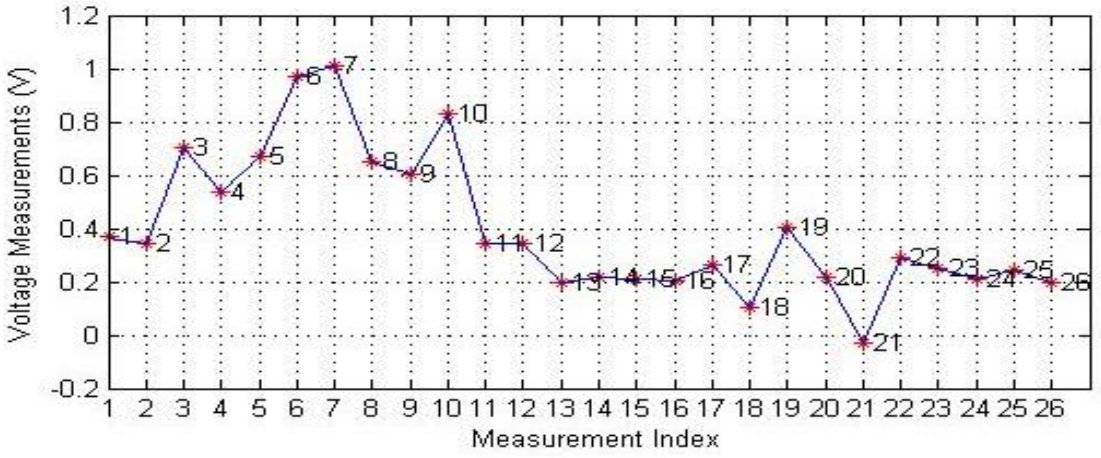

Fig.6 the voltage measurements corresponding to Fig.5

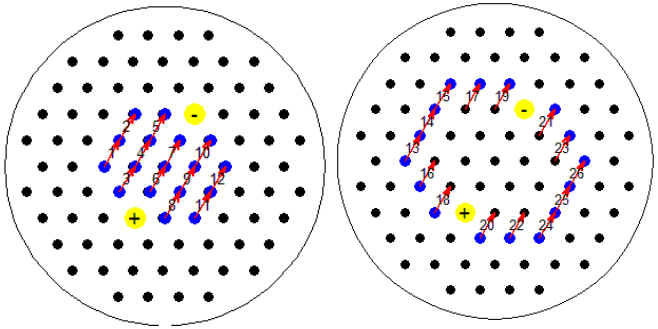

Fig.5 the 12 measurements in the measurement area and the 14 measurements outside the measurement area

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Thank you for your attention