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Analytical boundary element method to monitor bladder volume using electrical impedance tomography

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Information regarding the amount of urine or size of the bladder can help in the medical diagnosis of patients with paraplegia or overactive bladder. The bladder volume increases with amount of urine, thus it displaces the surrounding tissues and extends upward towards the abdomen wall. It is necessary to find an accurate and efficient method for estimating bladder volume by considering the impedance and movement of surrounding organ tissues. Electrical impedance tomography is a non intrusive and radiation free method that can provide the bladder size at a given time from the measurements recorded on the surface of the pelvis. The electrodes are placed around the pelvic region and current is injected into the body through these electrodes. The corresponding voltage is measured that quantifies the internal impedance distribution. This paper presents an analytical boundary element method for detecting changes in the size of the bladder. The boundary is represented using truncated Fourier Series and the changes in boundary voltages are measured for full and empty bladder. Numerical results with pelvic shaped boundary are performed and the results show that with bladder size change the boundary voltage is changed and it can be used to detect the size and shape of bladder boundary.

Biography

Anil Kumar Khambampati received his PhD from Department of Electronics Engineering, Jeju National University. He has published more than 30 papers and has been working as a Research Professor in the Institute for Nuclear Science and Technology, Jeju National University, South Korea.

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