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Carl Toews* (toewsc@duq.edu), Math/CS Department, College Hall, 6th Floor, Duquesne University, Pittsburgh, PA 15201. *An application of quaternions to a problem in position registration.*

Motivated by a technique in heart surgery, we are interested in determining the position of an electrode within a bounded, electrically inhomogenous region. If we could apply three linear, orthogonal potential fields u , v , and w across the region, the electrode could sample these fields and its position could be read directly from the samples. The presence of nonlinearities complicates this scheme.

One solution to this problem is to model each potential field as linear, plus a perturbation term expressible as a low order expansion in a harmonic basis. By first sampling this field with a multi-electrode probe and using the samples to solve for the expansion coefficients, the measurement function can be approximated, and then inverted. This talk considers the tractability of this scheme under certain assumptions on the probe, the bases, and the samples. It shows that a quaternion representation of the probe position can stabilize the inversion. (Received September 21, 2007)