

## 螺旋极片ECT传感器灵敏场分析

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摘要：

电容层析成像系统(ECT)中, 灵敏场分布作为反演计算的先验数据, 对测量结果影响相当大, 均匀的灵敏场能有效地提高浓度测量的准确性。直极片ECT传感器灵敏场不均匀程度较明显, 靠近极片处介质对相应的极片对电容的贡献份额较大, 而在靠近管道中心位置, 对各极片对的贡献份额均较小。因此在实际测量中, 对管道中心浓相分布和近管壁处环状稀相分布较难以区分。针对其在实际浓度测量中存在较大误差这一弱点, 本文使用电磁场仿真软件Ansoft对螺旋极片ECT传感器进行三维有限元仿真研究。结果表明: 螺旋极片ECT传感器这一理论模型, 具有更为均匀的灵敏场。这一结论对提高ECT传感器的测量质量具有重大意义。

关键词：电容层析成像；螺旋极片；灵敏场均匀程度；三维有限元仿真

## Analysis on Sensitivity field of Spiral Electrodes ECT sensor

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**Abstract:**

In the ECT system, the sensitivity distributions is the advance data for inversion calculus which affects the measurement result so much. Uniform sensitivity field could improve the accuracy of concentration measurements effectively. The uneven degree of straight electrodes ECT sensor is obvious. Medium contributes to the capacitance of the pair of electrodes, which is near the medium, much more. While medium around the center of the pipe contributes to the capacitance of all pairs of electrodes less. So that it is difficult to distinguish the following two conditions: medium of high concentration around the center of the pipe and medium of low concentration in the circularity area near the electrodes. For the weakness that there is a big error in the actual measurement, three-dimensional finite element simulation of spiral electrodes ECT sensor is put up by Ansoft in this paper. The result shows that spiral electrodes ECT sensor has a more uniform sensitivity field, which has great significance to improve the measuremental quality of ECT sensor.

**Keywords:** Electrical Capacitance Tomography; Spiral Electrodes; Uniformity of Sensitivity field; Three-dimensional finite element simulation

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