Feasibility of multiplexing coil array in magnetic induction tomography

Abstract: In magnetic induction tomography (MIT), the primary magnetic field is generated by the excitation coil and the magnetic induction field is measured by the receiver coil. As we know, the two kinds of coils have different parameters or structure in MIT literature.
There are two kinds of coil array. Firstly, a coil group with one excitation coil and one receiver coil is set same angle on a circle. The whole coil array is consisted of multiple groups. Secondly, the whole coil array is consisted of one excitation coil and multiple receiver coils. Only one coil, excitation or receiver coil, is set at the same angle. In order to reconstruct the conductivity distribution in one section of the subject, the measurement data at multiple angles is required. For the first coil array, the excitation coil in one group and the receiver coils in the other groups are selected, then changing in turn the excitation coil and the other receiver coils. For the second coil array, rotation of the subject or the coil array is needed to obtain the enough measurement data. In first coil array, the number of the coils is twice of the number of the channel. We know, the more the number of coils, the more serious the system noise. In second coil array, the number of the coils is equal to the number of the channel. But, the rotation will speed more time. If rotating the subject, the state may be changed.
We propose a new coil– multiplexing coil. At the same angle of the coil array circle, there only is single coil. This coil is not only the excitation coil but also the receiver coil. Through an electric switch, the data acquisition system is able to select whether the coil is the excitation coil or the receiver coil. Using the multiplexing coil, we will obtain the measurement data like the first coil array by electric switching and have the least number of the coil like the second coil array. The multiplexing coil may avoid the double number of the coil in the first coil array and the state chan

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