Abstract: Modelling of EIT instruments is important for accurate image reconstruction. This abstract explains how this can be done with EIDORS.

1 Introduction
Modelling of hardware imperfections in EIT has seen relatively little work. Systems have offsets, mismatched gains and crosstalk between channels. Many of these can be expressed as a linear correction to the sensitivity, \( J \). When a good model of the specific hardware is available the corrected \( J \) can be used to improve reconstructing images [2].

2 Methods
Since the finite-element method’s (FEM) system matrix represents the admittivity between nodes, additional admittances can be added directly to the system matrix (Fig 1). A new EIDORS[1] function \texttt{system_mat_instrument} is available to help form such a system matrix, and used as follows:

\[
\begin{align*}
\text{fmdl} &= \text{fem_model( } ... \text{ );} \\
\text{fmdl.system_mat} &= \text{system_mat_instrument;}
\end{align*}
\]

where \texttt{c_list} describes additional admittances and nodes. It is hoped that this description and new function helps users build improved models of EIT systems.

References

Figure 1: Incorporation of instrument models into a FEM, where the stiffness matrix (upper right) has additional nodes for complete electrode models (CEM) and instrument admittances. The lower figure shows a two-element FEM with two CEM electrodes and two additional admittances, and the formulation of the system matrix as a function of each component.