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The ***Datasets*** for Dual-diffusion with Physical Correction for EIT Image Reconstruction

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Abstract- This document is the additional part of the main manuscript 'Dual-diffusion with Physical Correction for EIT Image Reconstruction', which is the ***Supplementary Materials***. In this material, we provide more details of training datasets, such as the geometry and conductivities configuration of simulated information.

Index terms: EIT, inverse problem, diffusion models, Schrödinger Bridge (SB), physical correction (PC).

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[1] *The footnote includes the following issues: The afflation of each author, and the institution email should be marked. In addition, the corresponding author and funding have to be written in this part.* The examples are listed as:

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Ⅰ、Details of training datasets:

In this section, we provide more detailed information of the simulation training datasets.

The observation area is set a circular shape with the diameter of 0.19 m, and there are 16 electrodes uniformly attached on the outside boundary of the domain. The protocol of data acquisition is 'adjacent current excitation-adjacent voltage measurement', where the current is utilized with the amplitude of 4.5 mA and the frequency of 50kHz. The NaCl solution with 0.06 S/m is set up as background in the homogeneous field.

(1) Multiphase conductivities with complicated shapes: One to four circular inclusions with random position are simulated in database. The shapes of the inclusions include squares, triangles, and circles. There are also some mixtures of all three shaped inclusions. Among them, the squares and triangles having different angles of rotation and the inclusions not overlapping each other. The radius is set as the range of 0.02—0.08m, and inclusions do not intersect each other. The mediums are set to a different conductivity, whose value are in the range of 10^{-6}-10^{6} S/m. A total of 52,430 simulation samples are obtained. The training, validation and test samples are set to be 80%, 10% and 10% of the total database respectively.

(2) Healthy/injured lung-phantom datasets: The procedure of lung-shaped data mainly includes four steps: CT image selection, lung region segmentation, lung shape establishment, and model augmentation. The lung CT images are selected from the Lung Image Database Consortium image collection (LIDC-IDRI) provided by the Cancer Imaging Archive (TCIA). Eighty patients from the database are selected and randomly divided into two groups, in which the chest CT images of 70 patients are used as training samples and the CT images of the remaining 10 patients are used as test samples. For each patient, we only study the CT slices within 8-cm vertical distance to the central slice, which leads to 350 and 50 slices in the training and testing data sets, respectively. The global thresholding image segmentation algorithm is applied to extract the lung contours. The approximate conductivity parameters for the internal organs (subcutaneous tissue, lungs, heart/aorta and spine) are set to the Table I. The lung injury is simulated by randomly removing a portion of the lungs and replacing the missing portion with the other medium, where the conductivity of the injured lungs ranged from 0.165 to 0.285 S/m. For augmenting the simulation data, the Gaussian white noise is added into the measurements with a signal-to-noise ratio (SNR) of 65 dB. Finally, the number of simulated lung phantoms is 9,100 for training and 1,000 for testing, respectively.

Table I Conductivity values of different organs in the human chest.

Organs	Fat	Lung	Heart	Aorta	Spine
Conductivity	0.30	0.15	0.50	0.60	0.09