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Sound pressure estimation at an electroacoustic transducer's voicing face by way of all-electrical sensing

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When it comes to designing active control disposals, sound pressure sensing is usually required. In the framework of active control of acoustic impedance, this work aims at conceiving a digital estimator that processes voltage and current measurement to compute an estimation of the pressure in the vicinity of the diaphragm of an electro-dynamic speaker. After dealing with modeling concerns of the actuator, the bilinear transform is used to obtain equations of two IIR filters. An adaptive identification using the LMS algorithm and a SVD-based identification are tested to compute filters coefficient, both leading to poor experimental results. Accordingly, the actual transfer functions of the speaker are measured and optimal IIR filters are designed using the simulated annealing algorithm. It is then shown that good results can be achieved experimentally when the speaker is loaded electrically by a short circuit or an open circuit. Finally, performances of the process are discussed regarding other operating conditions.