# Estimation of Conduction Velocity Distribution of Nerve Fibers using an Inverse Problem Formalism in Electroneurography

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Nerve conduction study (NCS) has been used by clinicians for diagnosing several kinds of diseases of peripheral nervous system such as Carpal Tunnel Syndrome (CTS). NCS is not sufficient to provide detailed information about the characteristics of the active nerve fibres present in a nerve trunk. In literature, it has been shown that the severity of CTS depends on the condition of both slow and fast conducting fibres present in a nerve. In this context, it has become important to estimate the conduction velocity distribution (CVD) of both slow and fast fibres.

In the proposed paper, two different approaches that are based on the inverse problem formalism are used for estimating the CVD of nerve fibres. The first approach is concerned with the estimation of arrival time distribution of fast conducting fibres whose conduction velocities lie between 30 m/s and 80 m/s. These fibres contribute the main complex of the compound nerve action potential (CNAP) wave-shape. The second approach is concerned with the estimation of the arrival time distribution of slowly conducting fibres whose conduction velocities lie between 5 m/s and 30 m/s. These fibres contribute the late components of the CNAP wave-shape. The overall CVD of all the active fibres is obtained from the estimated arrival time distributions. A percentage mean square error (%MSE) is used for evaluating the performance of the estimator under different levels of noise.