Use of non-contact excitation via ultrasonic transducer permits excitation of higher frequencies not typically reached by traditional excitation methods. While quantification of the input force is necessary for characterization of the dynamic behavior of a structure, non-contact excitation is problematic, as it cannot be measured via traditional force transducers. However, use of frequency response functions obtained with traditional excitation methods may be compared with frequency response functions obtained from non-contact excitation to determine an appropriate calibration by which force and driving voltage may be related. Additionally, force estimation techniques relying on measured responses and calibrated frequency response functions may be used to estimate the associated input force power spectra.