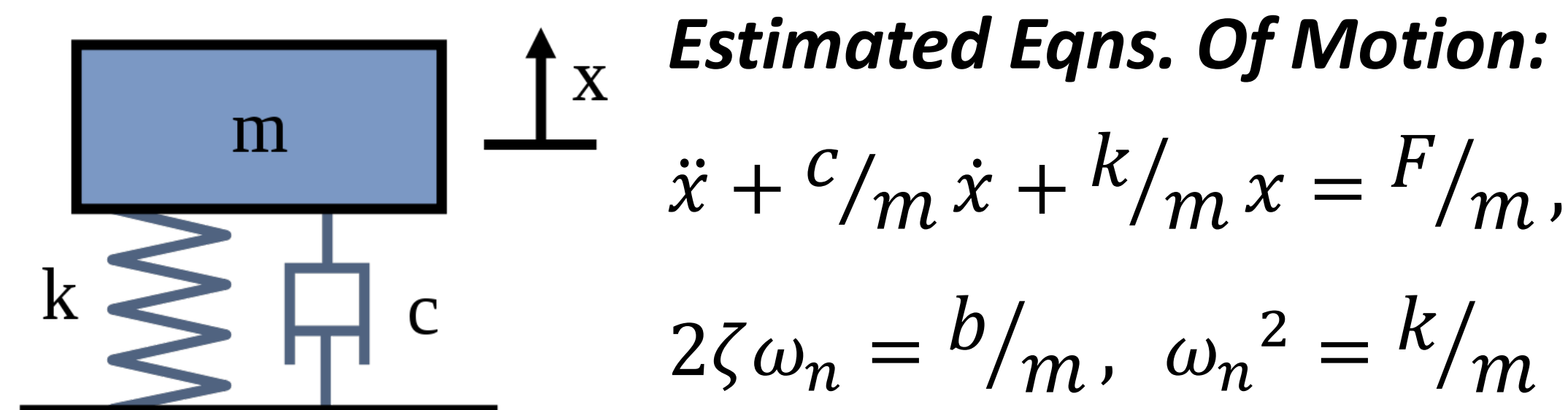


Introduction

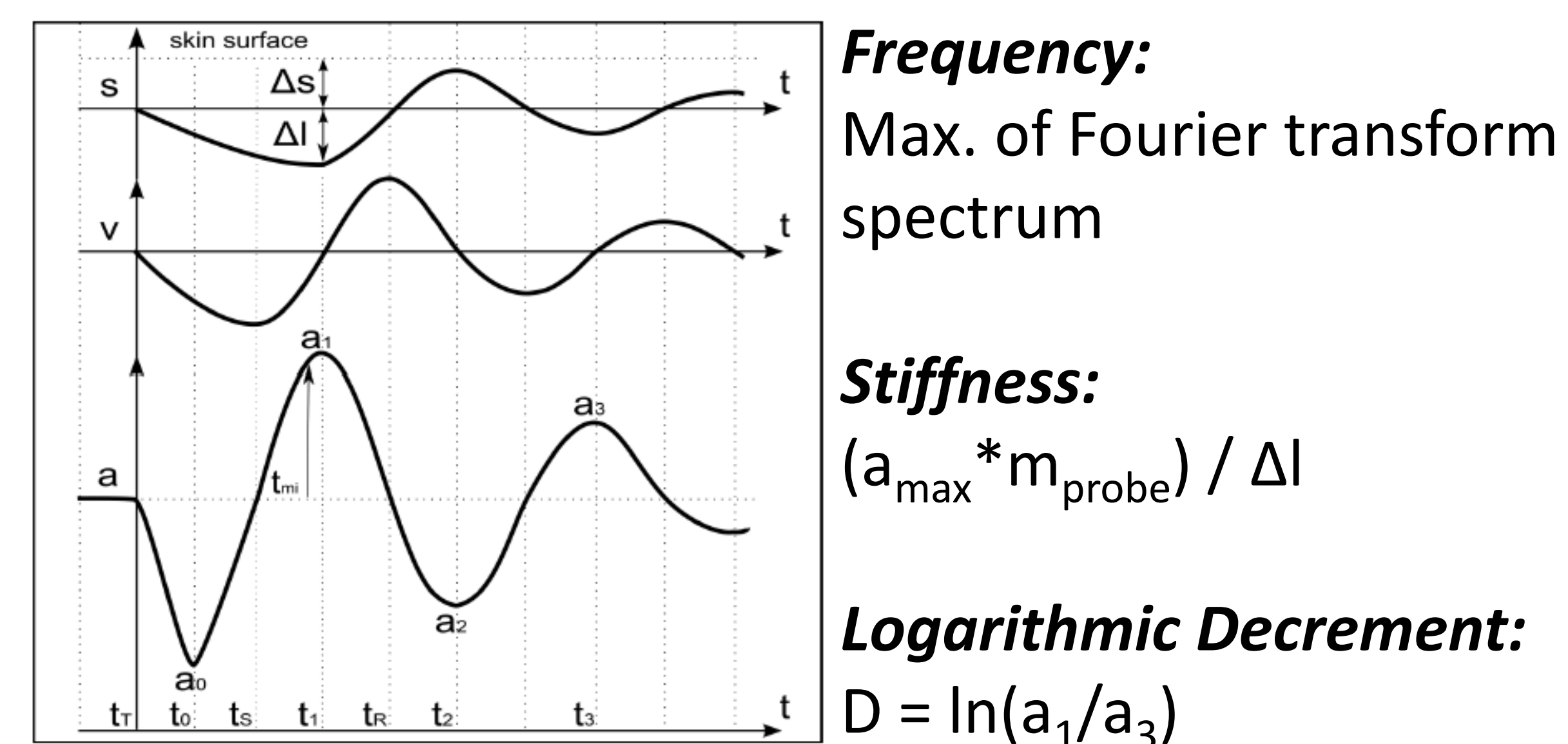
In cases of poor tissue health, the ability to identify pressure ulcer susceptibility and formation is paramount. However, without extensive training or experience with manual palpation, identifying abnormal tissue conditions is difficult and intrinsically subjective to the examiner. The goal of this work was to assess the performance of the MyotonPro digital palpation tool (Myoton AS, Estonia). Interclass correlation coefficients (ICCs) were calculated to quantify the repeatability and reliability of the measurements between raters over multiple trials.

Digital Palpation Technique

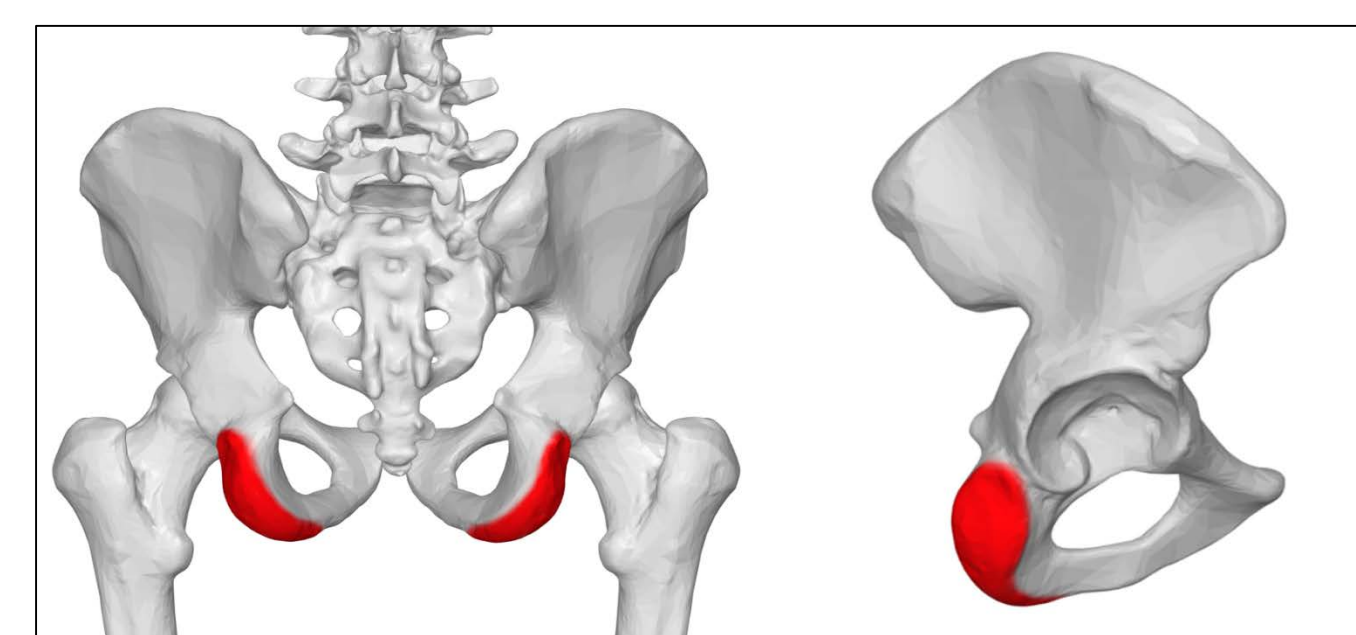
Dynamic Stiffness: Approximate underlying tissue as mass-spring-damper system and measure acceleration. The MyotonPro represents the underlying tissue as a mass-spring-damper system, seen here:



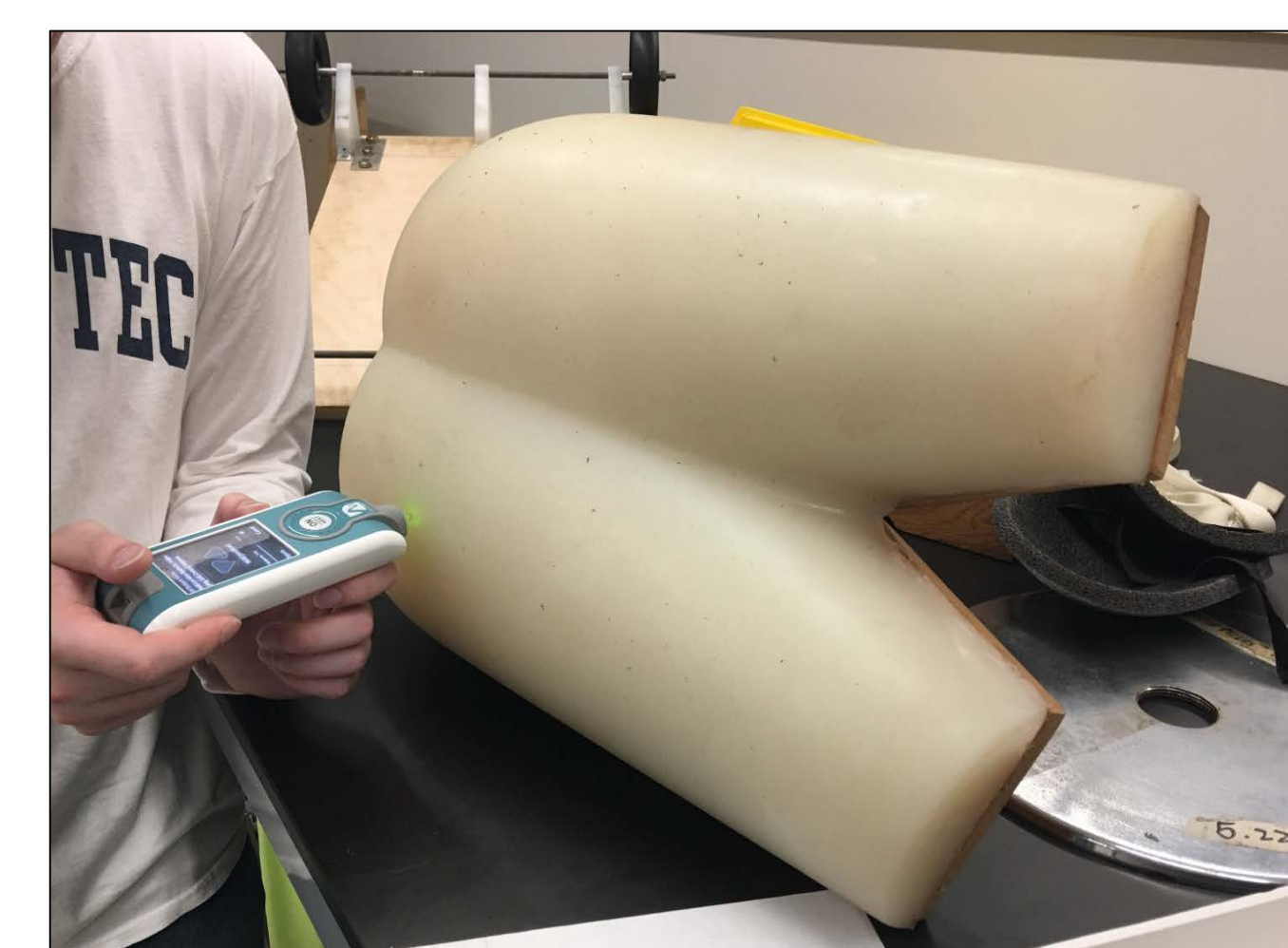
The acceleration of the 3mm-diameter probe is the \ddot{x} term in these equations. The device pre-load force is 0.18N and impulse is approximately 0.4N.



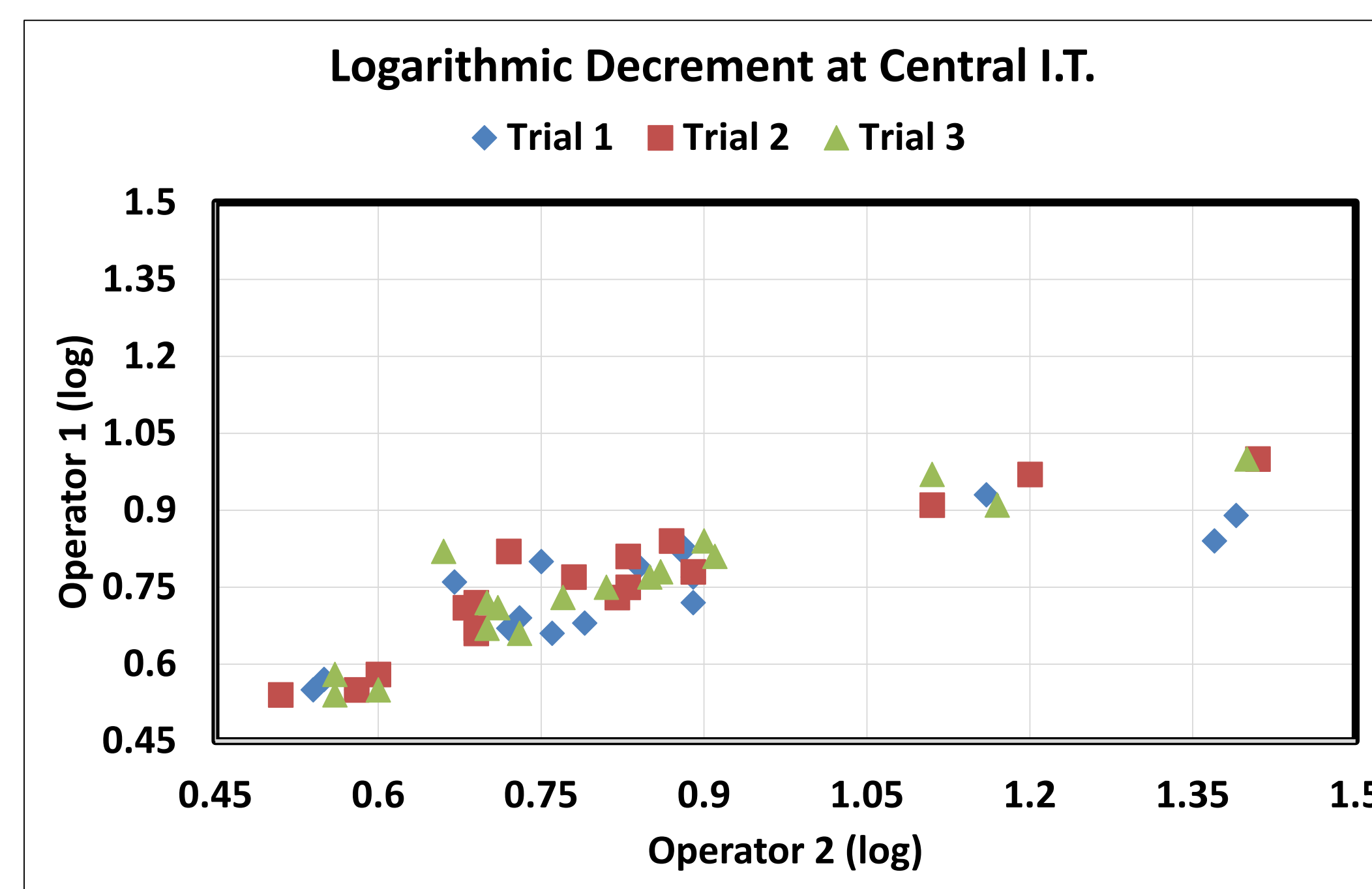
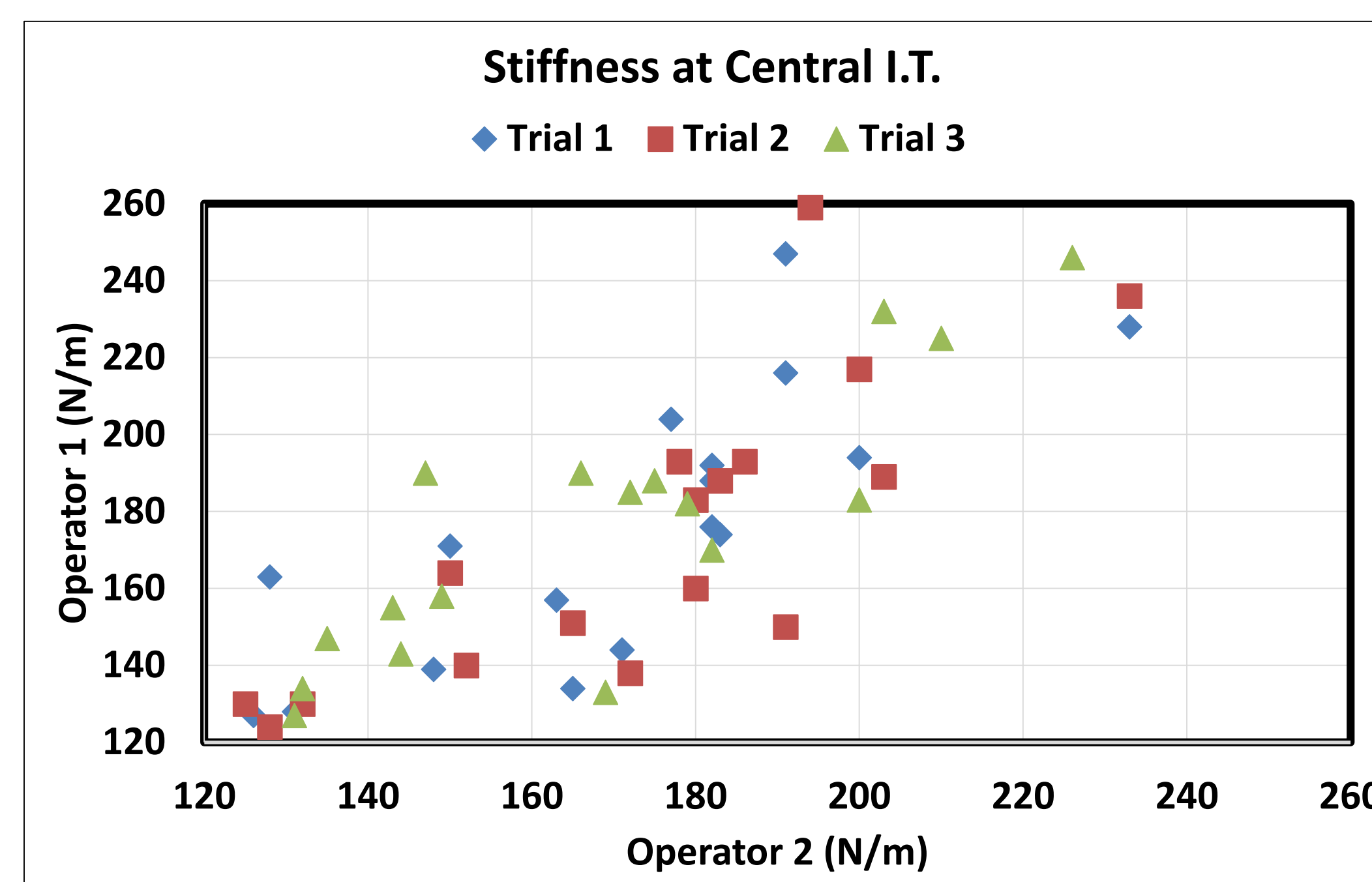
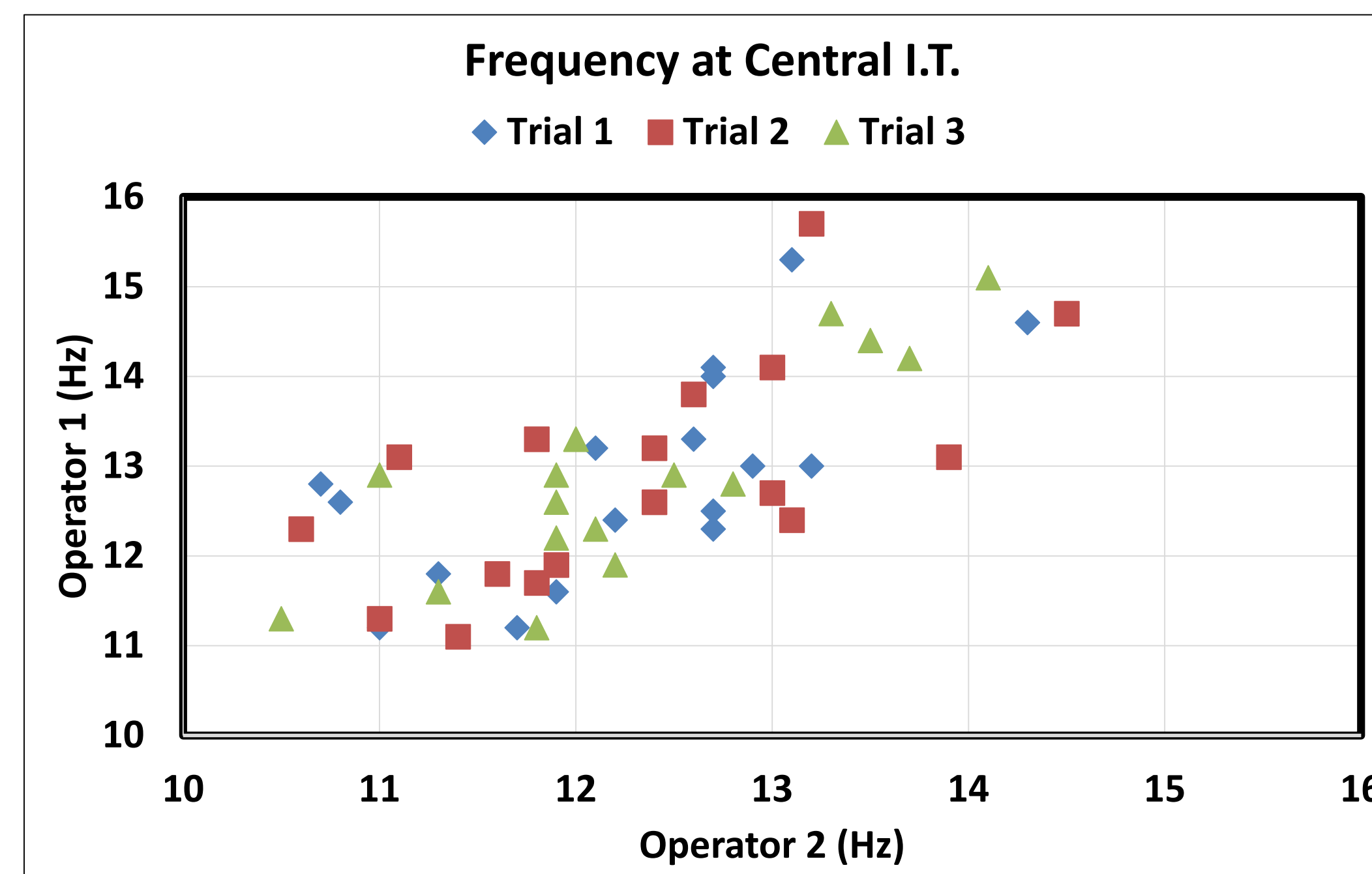
Methods and Data Collection



Testing Location: Ischial Tuberosity (I.T.)



Buttock Model of I.T. Test Location



Graphs displaying a visible correlation of inter-rater data points taken at the same location

Tabulated Results

| Parameter | Operator | Mean (Standard Deviation) | CoVs (All Locations) |
|-----------------|----------|---------------------------|----------------------|
| Frequency (Hz) | 1 | 12.913 (1.199) | 9.41 |
| | 2 | 12.366 (1.034) | 8.50 |
| Stiffness (N/m) | 1 | 176.97 (35.91) | 20.11 |
| | 2 | 173.26 (28.60) | 16.47 |
| Decrement (log) | 1 | 0.7481 (0.1239) | 16.41 |
| | 2 | 0.8317 (0.2283) | 27.54 |

These results show a clear similarity between operators, as is expected. Variations are due to test location or probe placement.

Discussion

Reliability and Repeatability Testing: The ICCs reported in this study were considered excellent (>0.75). Repeated testing at the central location yielded a Pearson correlation value of 0.854.

| | Operator | Frequency | Stiffness | Decrement |
|--|----------|-----------|-----------|-----------|
| Intra-rater (within session, same rater) | 1 | 0.95 | 0.95 | 0.95 |
| | 2 | 0.94 | 0.95 | 0.97 |
| Inter-rater | N/A | 0.77 | 0.86 | 0.81 |

Conclusions: The MyotonPro is a device capable of highly repeatable measurements, whether it is used by a single operator or multiple. The device removed much of the user influence from tissue palpation.

Future Work: The relationship between tissue health or pressure ulcer susceptibility and the MyotonPro readings at susceptible anatomical locations should be investigated to discover any potential clinical benefits to this method of digital palpation.

Limitations: This probe is not ideal for thicker adipose tissue testing due to its shallow depth of travel, which seems to be limited to superficial layers of tissue.

Acknowledgements

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