Figure Legends

Figure 1. A graphical representation of the state space of an ankle joint angle time series and the calculation of the largest Lyapunov Exponent. (A) An original ankle plantarflexion-dorsiflexion time series from a control subject. (B) A two-dimensional state space created by the position and velocity time series from the same ankle angle. Each step (from heel touchdown to heel touchdown in the same foot) includes both a large and a small circle. The large circle corresponds to the maximum ankle plantarflexion and dorsiflexion positions around toe off, while the small circle corresponds to the relatively smaller ankle plantarflexion and dorsiflexion positions around heel touchdown. This becomes apparent by comparing the maximum and minimum values from part A to the position values from part B. They range from about -20 degrees to 20 degrees for the absolute maximums (large circle) and from about -5 degrees to 5 degrees for the local maximums (small circle). (C) A section of the state space where the divergence of neighboring trajectories is outlined. The largest Lyapunov exponent is calculated as the slope of the average logarithmic divergence of the neighboring trajectories [(9)].

Figure 2. A graphical comparison of variability between a (A) periodic signal (sine wave), (C) Control subject ankle joint, (E) PAD ankle joint, and (G) a random signal (white noise). Graphs A, C, E, and G are the time series and graphs B, D, F, and H are two-dimensional state spaces created by plotting the position (X(t)) versus the velocity (X' (t)) from the corresponding signals. The largest Lyapunov Exponent (LyE) for each signal is also shown. It is clear that the PAD patient has much more divergence in the movement trajectories which results in a larger Lyapunov Exponent.