Perelman School of Medicine
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Dear Sir or Madam,

I am applying for the postdoctoral position in the Program in Applied and Computational Mathematics (PACM). I completed a PhD in mathematics with advisor G. Bard Ermentrout, and I am now a postdoc at the University of Pennsylvania under a one-year contract. Under the guidance of advisor Maria N. Geffen, we are modeling the roles of inhibitory interneurons on complex auditory processing.

Within PACM, I am interested in working with Naomi Leonard, who has substantial works at the interface of dynamical systems and biology. Several of her publications, including "Mixed mode oscillations and phase locking in coupled FitzHugh-Nagumo model neurons" (2018), align with my goal of understanding the role of oscillations in biology, and determining general conditions for synchrony and asynchrony. This particular paper is of great personal interest, as it includes the exploration of fast-slow systems and the existence of mixed-mode oscillations and canards.

As proof of my qualification to carry out successful collaborations, I reference my first-author publications in mathematical neuroscience while working with my dissertation advisor, Bard Ermentrout. In our first paper, we explore the effects of a neurotransmitter with slowly varying concentration on the synchrony of weakly coupled neurons through a phase reduction. Our second paper extends this phase reduction to account for internally-generated slow processes, and naturally includes cases with large phase drifts between populations. Our third paper introduces a novel dimension-reduction of a non-local equation of neural activity, which allows for a rigorous and thorough classification of the many different bifurcations of spatio-temporal solutions of the system. In addition to these primary topics, we published a book chapter on the consequences of the shape of the phase response curve on the synchronization properties of inhibitory and excitatory neurons. The sum of this research resulted in winning the prestigious Andrew Mellon Predoctoral Fellowship, which is awarded to doctoral students at the University of Pittsburgh of exceptional promise and ability.

I remark that the bulk of this work was completed as a doctoral student while completing additional, time-intensive departmental duties, such as teaching. My teaching portfolio boasts four years of teaching at different capacities (lectures, recitations, grading), at different levels (calculus 1, 2, 3, differential equations, linear algebra, and discrete math), for three terms per year (Spring, Summer, and Fall). My commitment to teaching resulted in a nomination for the Elizabeth Baranger teaching award, the most prestigious teaching award in the university.

As part of my application I include a research statement, curriculum vitae, and a list of publications. Please let me know if there is anything else I can provide, and I look forward to hearing from you.

Sincerely,

Youngmin Park