Personal Statement

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My motivation to pursue graduate education was simple: I was not satisfied with many of the explanations I had been given in my undergraduate engineering education and felt I had gaps — known unknowns, and unknown unknowns. An illustrative anecdote was when a professor was introducing phase plane plots for transfer functions: he drew the two axes and indicated the left-hand side, “If all your system’s poles are here, you will be stable.” When I asked why, he made a face as though he’d never been asked that, and told me to “...try it in MATLAB, and you’ll see.”

This pattern was repeated in several other courses, and then in my first role as an engineer. Soon, however, I had the privilege of working alongside a pair of highly talented mathematicians in my current role as a Research Engineer in Schweitzer Engineering Laboratories’ Infrastructure Defense division. Their casual, almost effortless understanding of many of the more advanced topics in signal processing, optimization, and more was, I’ll admit, a point of envy. I decided that while I’m generally fine with being the least knowledgeable in a group, this was too much of a disparity. Another illustrative anecdote: we were researching anomaly detection techniques. My one coworker came to my desk, threw down an IEEE journal article and said (paraphrasing): “Look what these fools did!” They had, effectively, combined several statistical quantities without discernible connection to one another and said “if this quantity exceeds this oddly specific value, we call it an anomaly.” It was akin to saying “if the ratio of pigeons to hawks on your line raised to the overall line capacitance exceeds 48.23458, you have an event.” The problem? I could not see that obvious error. Engineering practice is a house built on the foundation of mathematics, and I realized my abode was built on soft clay.

I soon applied for a program in Applied Math at the University of Washington to address this. In fact, my first course illuminated the left-hand plane mechanism (the homogenous response is comprised of complex exponentials with the poles in the exponent — of course negative real portions lead to asymptotic stability) and why nonlinearity is needed for real oscillators (What do you call Van der Pol’s hammock? A relaxation oscillator!). That was just the start. This program has given me the tools and confidence to readily engage with mathematical literature to tackle challenging engineering problems. My work in our Infrastructure Defense division has underpinned the immense gravity of these problems. I now want to continue my education in this space, to become the best engineer I can be, and to speak with confidence when it comes to problems of grave importance. And, given the best possible outcome, be able to answer questions from students, peers, and political leaders with intuitive, rigorous reasoning, rather than deferring to MATLAB.