POSSIBLE PROJECTS FOR MATH 605

I have attached below a list of possible papers that can be used for the Math 605 project. Of course you are free to chose your own paper that is related to the topics of the course, but if you do choose to do so please show me the paper first so that I can have a look.

1) Nonlinear Oscillators: Stick-Slip etc...

- J. Thomsen, "Using Fast Vibrations to Quench Friction-Induced Oscillations", J. Sound and Vibration, Vol. 228, (1999), pp. 1079–1102.
- K. Popp, P. Stelter, "Stick-Slip Vibration and Chaos", Phil. Trans. R. Soc. London A, Vol. 332, (1990), pp. 89–103.
- D.W. Storti, R. Rand, "The Dynamics of Two Strongly Coupled Van der Pol Oscillators", Int. J. Non-linear Mechanics, **17**(3), (1982), pp. 143–152.
- D. Quinn, R. Rand, and S. Strogatz, "Singular Unlocking Transition in the Winfree Model of Coupled Oscillators", Phys. Rev. E., **75**, (2007), 036218.

2) Delayed Bifurcation Phenomena

- S. Baer et al., "The Slow Passage Through a Hopf Bifuration: Delay, Memory Effects, and Resonance", SIAM J. Appl. Math., Vol. 49, No. 1, (1989), pp. 55-71.
- P. Mandel, T. Erneux, "The Slow Passage Through a Steady Bifurcation: Delay and Memory Effects". J. Statis. Phys. Vol. 48, (1987), pp. 1059-1070.
- A. Raman, A. K. Bajaj, P. Davies, "On the Slow Transition Across Instabilities in Non-Linear Dissipative Systems", J. Sound and Vibration, Vol. 192, No. 4, (1996), pp. 835–865.
- G. Maree, "Slow Passage Through a Pitchfork Bifurcation", SIAM J. Appl. Math., Vol. 56, (1996), pp. 889-918.
- A. Raman et al., "On the Slow Transition Across Instabilities in Non-linear Dissipative Systems", J. Sound and Vibration, **192**(4) (1996), pp. 835–865

3) Parameteric Resonance, Floquet Theory

- C. A. Klausmeier, "Floquet Theory; a Useful Tool for Understanding NonEquilibrium Dynamics", Theoretical Ecology, (2008), **1**, 153–161.
- M. Bartuccelli et al., "On the Dynamics of a Vertically Driven Damped Planar Pendulum", Proc. Roy. Soc., London A, Vol. 457, (2001), pp. 3007-3022.
- W. Zhang et al., "Effect of Cubic Nonlinearity on Auto-Parametrically Amplified Resonant MEMS mass sensor", Sensors and Actuators A, Vol. 102, (2002), pp. 139–150.
- A. Champneys, B. Fraser, "The Indian Rope Trick for a Continuously Felxible Rod: Linearized Analysis", Proc. Roy. Soc. London A, Vol. 456, (2000), pp. 553-570.
- M. Ashab et al., Melnikov-Based Dynamical Analysis of Microcantilevers in Scanning Probe Microscopy", Nonlinear Dynamics, Vol. 20, (1999), pp. 197-220.
- A. Beyakov et al., "Dynamics of the Pendulum with Periodically Varying Length", Physica D, **238**, (2009), pp. 1589–1597.

- N. Rajanbabu et al., "Multiple Scales Analysis of Early and Delayed Boundary Ejection in Paul Traps", Int. J. Mass Spectrometry, **261**, (2007), pp. 170–182.

4) Delay Differential Equations

- A. Fowler, "Asymptotic Methods for Delay Equations", J. Eng. Math., Vol. 53, (2005), pp. 271–290.
- N. Mamachchivaya, "Spindle Speed Variation for the Supression of Regenerative Chatter", J. Nonlinear Science, Vol. 13, (2003), pp. 265-288.
- G. Stepan et al., "Delay, Parametric Excitation, and the Nonlinear Dynamics of Cutting Processes", International J. Bifurcation and Chaos, Vol. 15, No. 9, (2005), pp. 2783–2798.
- G. Orosz et al, "Subcritical Hopf Bifurcations in a Car Following Model with Reaction-Time Delay", Proc. Roy. Soc. London Series A, Math Phys. Eng. Sci., Vol. 462, (2006), no. 2073, pp. 2643–2670.
- J. Veerman, C.M. Fonseca, and F.M. Tangerman, "Stability of Linear Flocks on a Ring Road", arXiv:1002.0787v1 Feb. 2010
- T. Kalmar-Nagy et al., "Subcritical Hopf Bifurcation in the Delay Equation Model for Machine Tool Vibrations", Nonlinear Dynamics, Vol. 26, (2001), pp. 121-142.
- Y.N. Kyrycho et al., "Modeling Real-Time Dynamics Substructuring Using Partial Delay Differential Equations", Proc. Roy. Soc. A (2007), **463**, pp. 1509–1523.

5) Stability Theory: Non-Self Adjoint Eigenvalue Problems

- J. Pelesko, "Nonlinear Stability, Thermoelastic Contact and the Barber Condition", Transactions of the ASME, Vol. 68, (2001), pp. 28–33.
- J. Pelesko, "Nonlinear Stability Considerations in Thermoelastic Contact", Journal of Applied Mechanics, Vol. 66, (1999), pp. 109-116.
- G. Kalna, S. McKee, "The Thermostat problem with a Nonlocal Nonlinear Boundary Condition", IMA J. Applied Math, Vol. 69, (2004), pp. 437–462.

6) MEMS Devices

- J. Pelesko, "Nonlocal Problems in MEMS Device Control", J. Eng. Math., Vol. 41, No. 4, (2001), pp. 345-366.
- J. Pelesko, "Mathematical Modeling of Electrostatic MEMS with Tailored Dielctric Properties", SIAM J. Appl. Math., Vol. 62, No. 3, (2001), pp. 888-908.
- Y. Guo et al " Touchdown and Pull-in Voltage Behavior of a MEMS Device with Varying Dielectric Properties", SIAM J. Appl. Math., Vol. 66, (2006), pp. 309–338.
- S. Filipas and R. Kohn, "Refined Asymptotics for the Blow-up of $u_t - \Delta u = u^p$", Commun. Pure and Applied Math., **45**(7), (1992), pp. 821–869.

7) Lubrication Theory

- J. Dockery, I. Klapper, "Finger Formation in BioFilm Layers", SIAM J. Appl. Math., Vol. 62 No. 3, (2002), pp. 853–869.

- J. Moriarity, E. Terrill, "Mathematical Modeling of the Motion of Hard Contact Lenses", Europ. J. Appl. Math., Vol. 7, (1996), pp. 575–594.
- T. Witelski, "The Dynamics of Air Bearing Sliders", Physics of Fluids, Vol. 10, No. 3, (1998), pp. 698–708.
- T. Witelski, A. Bernoff, "Dynamics of Three-Dimensional Thin Film Rupture", Physica D, Vol. 147, (2000), pp. 155-176.
- R. Craster, O. K. Matar, "Dynamics and Stability of Thin Liquid Films", Reviews of Modern Physics, Vol. 81, (2009), pp. 1135–1189.