P486 GRADING RUBRIC

| Category | Generic Criteria | Problem Specific Criteria | Comments | Score |
|---|---|---|---|---|
| Physical Transcription | Physical model is introduced, and parameterized to exploit symmetries and appropriate spatial and temporal scales. Computational algorithm is explained, including any approximations and the method of discretization. | Write-up provides a thorough and accurate description of the physical model and equations of motion for a damped, driven pendulum. The conceptual meaning, units, and symbolic notation is explained for all variables. The methods used for numerical calculations are described, including the methods used to calculate and select datapoint for visualization in the Poincare sections & bifurcation diagrams. | | /2 |
| Planning | Program is written in a modular manner, either using functions or comments to divide code into segments that can be understood and tested separately. *Data elements are matched to the goal and method of the calculation.* | Program includes at least one function devoted to updating the properties of the pendulum at each step in its trajectory. | | /2 |
| Implementation | Code, as provided to instructor, *is consistently and clearly commented*. Inputs, variables and function names are descriptive and indicative of their contents and purpose. | Code was provided to instructor, is consistently and clearly commented, and descriptive names are used for inputs, variables + functions. | | /2 |
| Testing | Evidence is provided that the algorithm works correctly, as validated by known solutions. Sample outputs submitted to instructor are accurately calculated. | Figures requested for validation of the accuracy of the model (Figures 3.6, 3.8, & 3.9 from Giordano & Nakanishi) are included and accurate. | | /2 |
| Running | *Initial conditions are chosen judiciously. Output is organized and labeled and input parameters used in each run are recorded. Multiple runs, if necessary, are automated efficiently through scripts.* | | | /2 |
| Visualization | Figures well designed, clear & easy to parse, and direct the readers attention to the most relevant information. Text is easy to read. Visual elements (symbols, lines, colors, etc.) are defined and have a professional appearance. | Figures requested are formatted to maximize similarity to provided examples; resolution of figures is sufficiently high to reveal full detail of Poincare sections + bifurcation diagram. | | /2 |
| Numerical Analysis | Dominant source of numerical error is identified and quantified. Solution's convergence is demonstrated, placing quantitative limits on numerical effects due to finite discretization, iteration, or realization. | Numerical accuracy is demonstrated by convergence tests and/or comparison to analytic solutions or limiting/known cases. | | /2 |
| Physical Analysis | System's adherence to physical constraints (i.e., limiting cases, conservation laws) are verified. Results are compared to initial hypothesis or goal, and interpreted in context of initial physical model. | The physical accuracy of the code is demonstrated by demonstrating a near-zero time difference for horizontal launch angles when drag is turned off. Write-up also analyzes time difference for the horizontal case first, and then considers the variation in the time difference as a function of launch angle. | | /2 |
| Written Presentation | Text professionally written? Write-up well organized? Sections labelled & in sensible order? Figures well placed w.r.t relevant text? | Write-up is well organized and clearly written. Sections are well labelled, and all figures are provided with descriptive captions, and referenced in the text. | | /4 |
| | | | Total Score | /20 |