EGR 103L – Fall 2016

LaTeX Assignment

NAME (NetID)

Lab Section N, DAY TIMES

DATE DUE

I understand and have adhered to all the tenets of the Duke Community Standard in completing every part of this assignment. I understand that a violation of any part of the Standard on any part of this assignment can result in failure of this assignment, failure of this course, and/or suspension from Duke University.

Contents

List of Figures

1 Equations

- General second-order system equation[1, p. 221]:

$$\frac{1}{\omega_n^2}\frac{d^2x(t)}{dt^2} + \frac{2\zeta}{\omega_n}\frac{dx(t)}{dt} + x(t) = K_S f(t)$$

- The Secant Formula for finding maximum stress in a column[2, p. 681]:

$$\sigma_{\max} = \frac{P}{A}\left[1 + \frac{ec}{r^2}\sec\left(\frac{L}{2r}\sqrt{\frac{P}{EA}}\right)\right]$$

- Characteristic determinant for a 2x2 system of differential equations[3, p. 152]:

$$\begin{aligned}
\det\left(\mathbf{A} - \lambda\mathbf{I}\right) &= \begin{vmatrix} a_{11} - \lambda & a_{12} \\ a_{21} & a_{22} - \lambda \end{vmatrix} \\
&= \left(a_{11} - \lambda\right)\left(a_{22} - \lambda\right) - a_{12}a_{21} \\
&= \lambda^2 - \left(a_{11} + a_{22}\right)\lambda + a_{11}a_{22} - a_{12}a_{21} = 0
\end{aligned} \tag{1}$$

- Definition of the Lyapunov exponent[4, p. 56]:

$$h = \lim_{T\to\infty}\frac{1}{T}\ln\left|\frac{dx_T}{dx_0}\right| \tag{2}$$

$$h = \lim_{T\to\infty}\frac{1}{T}\sum_{n=0}^{T-1}\ln\left|M'(x_n)\right| \tag{3}$$

$$h = \int \ln\left|M'(x)\right|d\mu(x) \tag{4}$$

2 Tables using `tabular` and `array`

2.1 Using `tabular`

Converting ammonia into nitric acid - the Ostwald Process[5]:

Description	Chemical equation
Oxidization of Ammonia	$4\,NH_3$ (g) + $5\,O_2$ (g) $\to$ $4\,NO$ (g) + $6\,H_2O$ (g)
Oxidization of Nitric Oxide	$2\,NO$ (g) + O_2 (g) $\to$ $2\,NO_2$ (g)
Absorption of Nitrogen Dioxide	$3\,NO_2$ (g) + H_2O (l) $\to$ $2\,HNO_3$ (aq) + NO (g)

2.2 Using `array`

Equation	Description
$\vec{v} = v_x\hat{\imath} + v_y\hat{\jmath} + v_z\hat{k}$	Resolution into Components
$v^2 = v_0^2 + 2a\Delta x$	Velocity formula

3   Comments

Things I learned in this assignment:

- How to use the `align` and `align*` environment to typeset numbered and unnumbered equations and using the `nonumber` command to suppress numbering equations in an `align` environment;

- How to use $ to enter math mode in a line of text to type shorter mathematical expressions like 10^6 and ∇u or Greek letters like Δ;

- How to use the `mathrm` command to put super- and subscripts in regular, versus italic, type for things like V_{min} instead of V_{min};

- How to change the appearance of fonts to make words **bold**, *italics*, or `typewriter font`;

- *Add another thing you learned here - your first choice*;

- *Add another thing you learned here - your second choice*; and

- *Add another thing you learned here - your third choice.*

A Codes

A.1 Listing of full sample header for original code

```
1    % [Function or Script Name]
2    % [Your Name]
3    % [Date Modified]
4
5    % I understand and have adhered to all the tenets of the
6    % Duke Community Standard in creating this code.  I understand
7    % that a violation of any part of the Standard on any part of
8    % this assignment can result in failure of this assignment,
9    % failure of this course, and/or suspension from Duke University.
10   % Signed: [Your NetID]
```

A.2 Listing of short sample header for original code

```
1    % [Function or Script Name]
2    % [Your Name]
3    % [Date Modified]
4
5    % I have adhered to all the tenets of the
6    % Duke Community Standard in creating this code.
7    % Signed: [Your NetID]
```

A.3 Listing of full sample header for modified code

```
1    % [Function or Script Name]
2    % [Your Name]
3    % [Date Modified]
4    % Based on: [Original Script or Function]
5    % Written by: [Original Author]
6
7    % I understand and have adhered to all the tenets of the
8    % Duke Community Standard in creating this code.  I understand
9    % that a violation of any part of the Standard on any part of
10   % this assignment can result in failure of this assignment,
11   % failure of this course, and/or suspension from Duke University.
12   % Signed: [Your NetID]
```

A.4 Listing of short sample header for modified code

```
1    % [Function or Script Name]
2    % [Your Name]
3    % [Date Modified]
4    % Based on: [Original Script or Function]
5    % Written by: [Original Author]
6
7    % I have adhered to all the tenets of the
8    % Duke Community Standard in creating this code.
9    % Signed: [Your NetID]
```
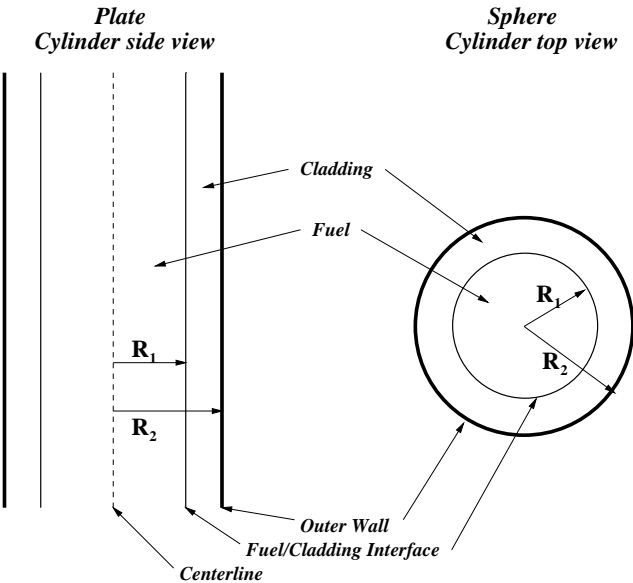
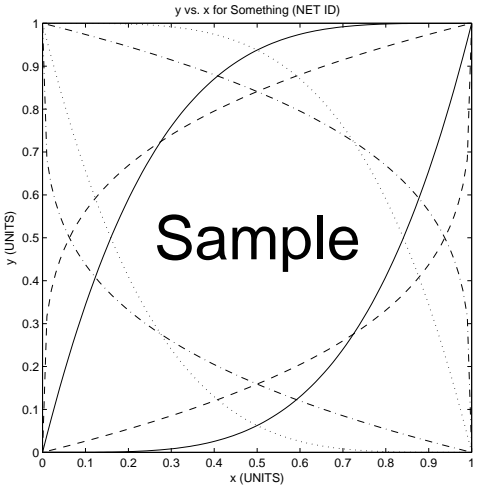# B   Figures

Figure 1: Drawing from ME 431L test.

Figure 2: Sample MATLAB figure.

References

[1] Rizzoni, Georgio, *Principles and Applications of Electrical Engineering.* McGraw-Hill, New York, 5th Edition, 2007.

[2] Hibbeler, R. C., *Mechanics of Materials.* Pearson Prentice Hall, Upper Saddle River, NJ, 8th Edition, 2011.

[3] Kreyszig, Erwin, *Advanced Engineering Mathematics.* John Wiley & Sons, New York, 8th Edition, 1999.

[4] Ott, Edward, *Chaos in Dynamical Systems.* Cambridge University Press, Cambridge, UK, 1st Edition, 1993.

[5] Wikipedia, *Ostwald process* (http://en.wikipedia.org/wiki/Ostwald_process). Online; accessed 19-Aug-2012.