H. Data Interdependencies

Using data without looking to see if there are dependencies can be lead to predictions from your simulation which are significantly wrong.

In this section you will learn:

1. To recognize when data are dependent
2. The substantial impact data dependencies can have on simulation predictions.

H1. Exercise -- Dependent Data

An EAR process allows you to adjust the level of dependency in data you generate. If you plot data from an EAR process as a histogram, it looks like an exponential distribution. However, it is not. This makes data from an EAR process an interesting way to explore the effects of dependent data.

Find the EAR equation in section 9.6 of the text. Write it down and discuss what it does.

H2. Computer Exercise -- Dependent Data

Access EAR_PRO1.MOD. Run the model for different R (SCORR) values. Make sure that the value of MST is ten. Start at R=0.01 (almost no dependence) and look at the line plots, histograms, autocorrelation plots, and STS plots. (Read Section 10.3.2 in your text to understand how to interpret autocorrelation plots and STS plots.) Run the model long enough to get a good idea of how the plots behave over time. Comment on the results. Repeat for R=0.99 (almost complete dependence). Repeat for R=0.15, 0.75 and 0.95.

H3. Computer Exercise -- Dependent Data

Access WALKER. Run it and observe and comment on the autocorrelation plots and STS plots of the step size and walker location.

H4. Exercise -- Dependent Data

In your previous exercises you might have seen that the output data showed dependencies. Simulation output is invariably dependent.

1. Explain what is meant by dependent data.

2. Describe how autocorrelation plots and STS plots show that the data is dependent.

3. Sketch examples of autocorrelation plots that show

i) strong long lasting dependencies
ii) strong, but short lived dependencies
iii) lag one negative dependencies.

H5. Computer Exercise -- Detecting Trends

Refer to Section 10.3.1 of your text. Access C19116.MOD.

a) What does this simulation do?

b) Run C19116.MOD. Look at the step plot and standardized time series plots for X. Shift between the plots and tell me when you are able to clearly detect a trend and from which plot you drew your conclusion.

c) Repeat b) for a negative trend, -CLK/2000. How are the plots different from b)?

d) Repeat b) for a trend of +CLK/10,000.

e) What do you think about standardized time series plots as a way of detecting trends?

H6. Computer Exercise – Dependent Output Data

Output data from either real or simulated processes is invariably dependent. To see this, you are going to look at the outputs of BK219116. Make sure that the settings are as given in C5. Be sure to remove the trace on events where no state change for the variable in question takes place. Why must you do this? Look at the line plots, histograms, autocorrelation plots, and STS plots of the waits and delays. (Read Sections 10.3.1 and 10.3.2 in your text to understand how to interpret autocorrelation plots and STS plots.) Run the models long enough to get a good idea of how the plots behave over time. You may have to increase the dimension of W[ ]. Comment on the results.