

Why do we need a Mathematical Model?

May 19, 2006

1. Let y_{true} denotes the true displacements of the beam, y_{data} denotes the data collected in the CRSC lab, and y the solution of our beam model.
Is it always possible to find a mathematical formula to express y_{true} as a function of time? How can we compare: y_{true} and y_{data} , y_{true} and y , and y and y_{data} ?
2. Assume we do not have a model. Can we just with data collected in the CRSC lab derive a good understanding of the system?
3. Assume we do not have a model, and that we have interpolated the data from the Beam in the CRSC lab and obtained a functional relationship between the displacements and the times. Can we use this functional relationship to study a larger beam?
4. Is it possible, just with experiments to obtain all necessary or desirable data of a physical system?
5. Can we fit the model without experiments?

6. Why do scientists use both models and observed data?

7. Give examples from science and industry where it is extremely difficult to collect data, and scientists mainly rely on mathematical models