All Models are Wrong

Structural analysis with Ansys Workbench

Third Edition

Wassee Syed, P.E.

This work is dedicated to Ali ibn Abi Talib, the gate to the city of knowledge

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Engineering Analysis

1. Why this book?

"*Every vessel becomes narrow with what is placed in it, except for the vessel of knowledge, for it expands*[1]." – Ali ibn Abi Talib

There is no shortage of high-quality texts on engineering analysis. One can acquire professionally written books on topics that cover the theoretical basis of numerical modeling techniques as well as the software packages available to perform such analyses. In addition to books, there is a variety of free (and paid) resource material available on the internet that will teach you the mathematics behind analysis and the practical steps needed to master software suites such as ANSYS and ABAQUS.

In my opinion, there are five aspects pertaining to engineering analysis:

1. Knowledge of the fundamental physics governing the problem at hand
2. Knowledge of the mathematical techniques required to model the physics
3. Knowledge of the software package in which to run the simulation
4. **Insight that arises from a deep understanding of modeling and analysis**
5. **Wisdom that is gained by understanding one's abilities and limitations**

The resources that are widely available primarily (some exclusively) deal with the first three aspects. There is no doubt that these aspects are pre-requisites to succeeding as an engineering analyst. However, these three factors are **necessary**, but **not sufficient** conditions for excellence.

There are a number of "soft skills" that an analyst must acquire before they can do justice to the work that they are doing. By soft skills, we imply skills and abilities that may be difficult to recognize and quantify but play a significant role in the growth and development of an analyst.

These soft skills reflect one's insight and wisdom as listed in points 4 and 5 above.

We must remember that wisdom is different from knowledge. A lot of knowledgeable people are unwise, and a lot of wise people have only basic knowledge.

In the first part of this book, we will make an effort to discuss the soft skills that can benefit an engineering analyst. We will look at the numerous ways in which these skills and abilities can enhance and enrich one's experience and value as an analyst.

In Part 2 of this book, we will look at some of the technical details of structural analysis, numerical simulations and Ansys[2].

Finally, in part 3, we will touch upon some best practices for analysis in general and for Ansys Mechanical in particular.

[1] *Bihar-ul-Anwaar, Volume 1, Page 183*

[2] Ansys is one of the major companies specializing in building products geared towards scientific computation and engineering simulations. Ansys Mechanical is the structural analysis suite.