

530.215 MECHANICS-BASED DESIGN

Laboratory I: Solid Modeling with ProE

Due: Mar. 8, 2009

Objective of this Laboratory:

Learn ProE, and use it to construct a solid model of a component. This component will later be used in the second lab (on the finite element method).

Location:

Krieger, the Academic Computing area.

Procedure (See the attached for detailed procedure):

Choose a geometry from the attached Figures 1, 2, or 3 of the text (1 and 2 give you extra credit in the second lab). It is a good idea to choose the dimensions so that the Stress Concentration Factor (described in class later) is easily read from the chart.

The attached introduction to using ProE was written by a former ME senior as a special project, and then updated by Erik Phillips and Hiroshi Yamaguchi. They should help to complete the lab.

Note: This introduction includes (Part 2) instructions for finite element analysis of this component under load, which is the second laboratory exercise. You do not need to do this part at this time.

Learning ProE may take a good bit of time, but this is definitely worthwhile.

Now construct a solid model of the component that you have chosen. Learn how to generate CAD drawings of the part showing the various dimensions.

You may work with fellow students. However, *each student must submit a separate lab report*. The report is to consist of:

- CAD drawings of the component with dimensions, including at least two plan views and a projection (3D) view. You may print these on standard letter size paper.
- A color print of the solid model.
- Comments on your experience using ProE.

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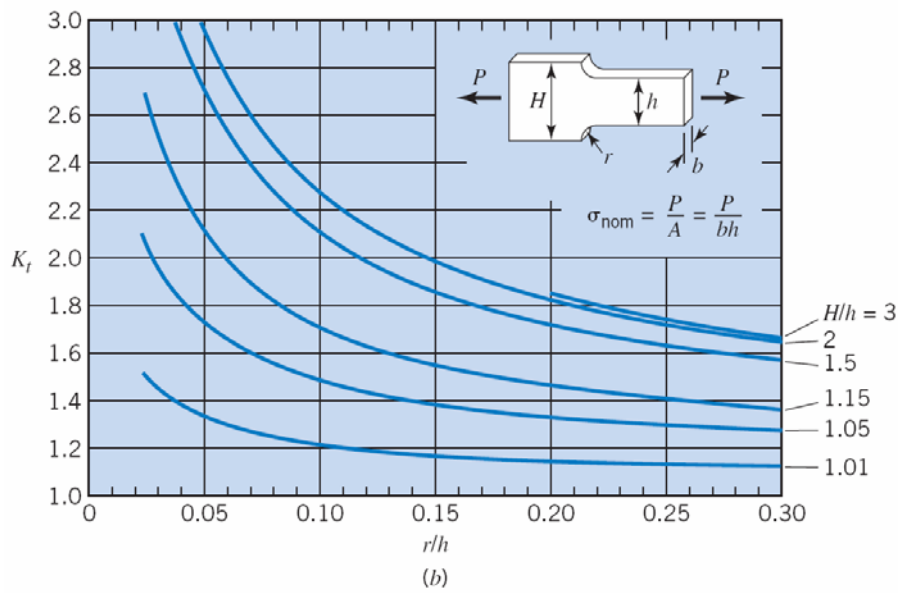
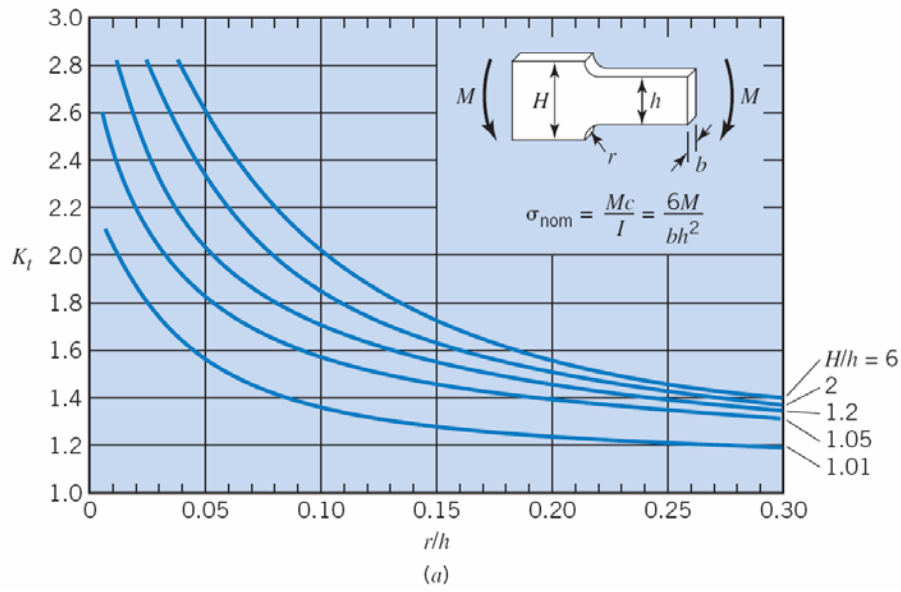


Figure 1. Stress concentration factor (K_t) for bar with shoulder

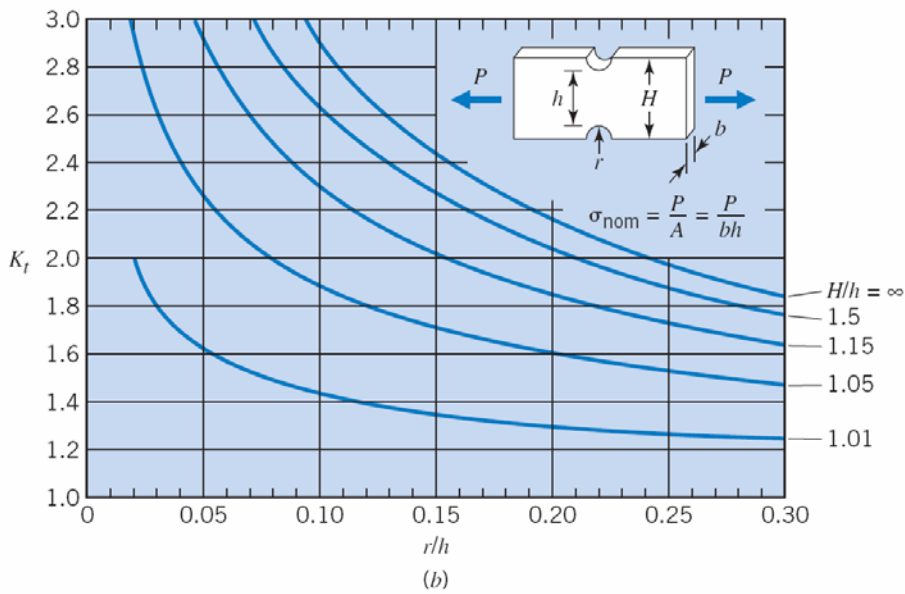
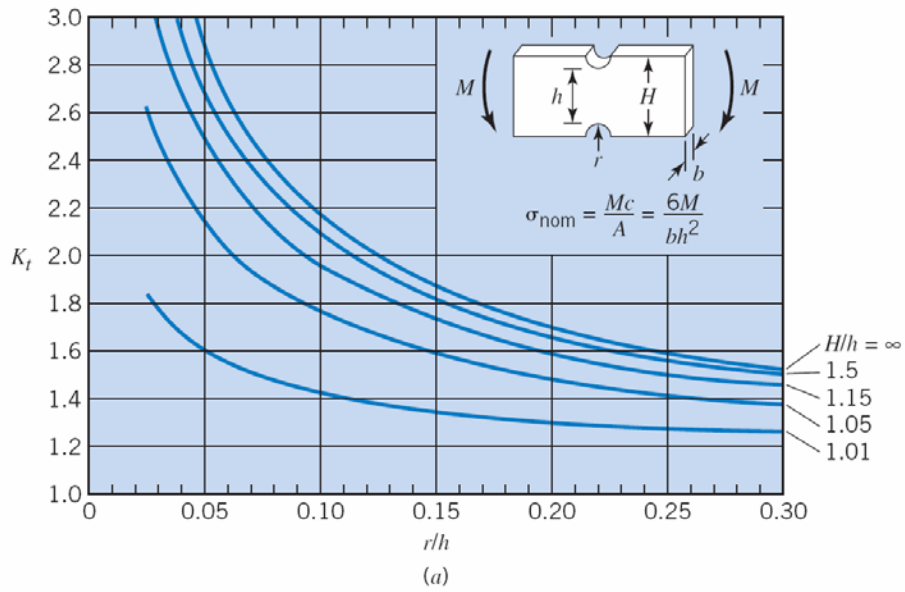


Figure 2. Stress concentration factor (K_t) for notched flat bar (a) bending; (b) tension

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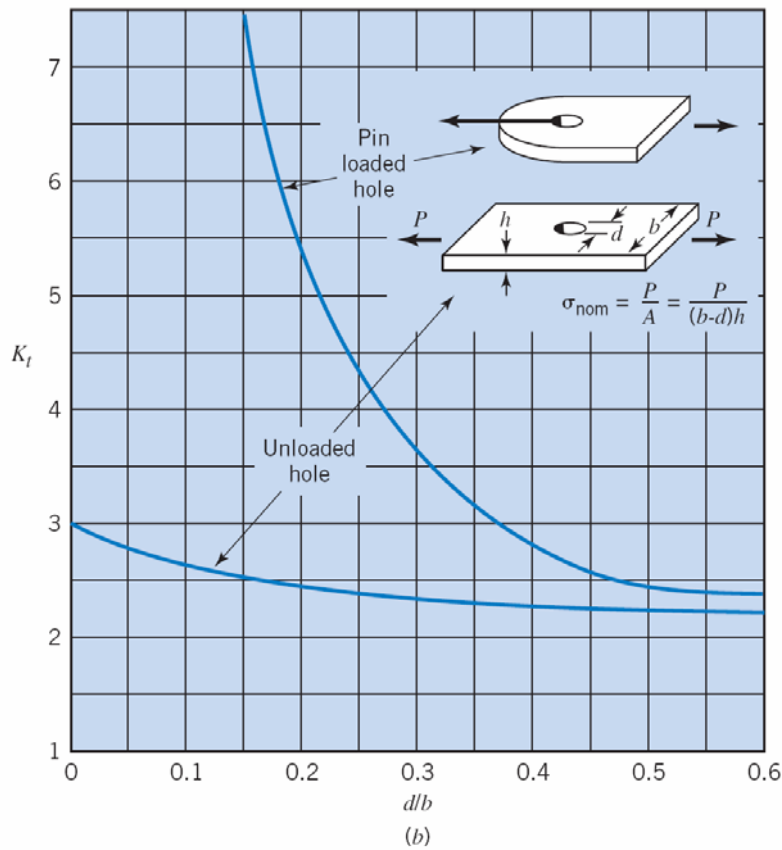
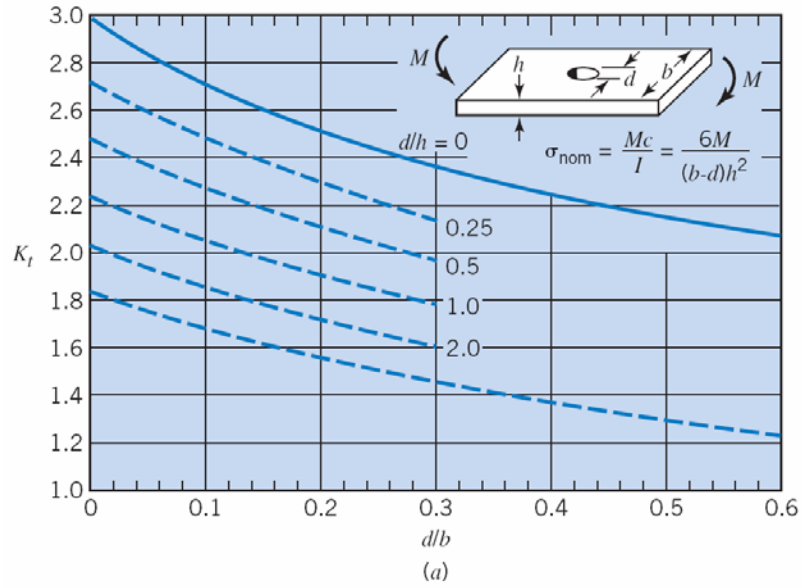


Figure 3 Stress concentration factor (K_t) for plate with central hole (a) bending; (b) axial hole