Notes on the enclosed papers

I have included four papers (all short) with my application. They are ordered conceptually, and these notes should help you decide which are worth reading.

Paritosh, P.K. and Forbus, K.D. (2003). Qualitative Modeling and Similarity in Back of the Envelope Reasoning. In *Proceedings of the 25th Annual Conference of the Cognitive Science Society*, Boston.

This is a good place to begin. This paper introduces Back of the Envelope (BotE) reasoning, argues about the intellectual and practical importance of this domain, and presents a first-cut sketch of my solution to the problems in modeling it. With illustrative examples, this paper provides a good overview, and raises more questions than it answers. The two papers below answer most of the questions put forth in this paper.

Paritosh, P.K. and Forbus, K.D. (2005). Analysis of Strategic Knowledge in Back of the Envelope Reasoning, In Proceedings of the *20th National Conference on Artificial Intelligence (AAAI-05)*, Pittsburgh.

This paper is based on my system BotE-Solver that generates numerical estimates. A key aspect of Back of the Envelope reasoning is the *strategies* that help find approximate answers when none can be directly found. This paper presents the seven strategies used by BotE-Solver, and argues based on empirical and logical bases that these are possibly the complete set of strategies needed for such reasoning. Although the main focus of this paper is the strategies, it also provides a brief description of the design and implementation of BotE-Solver.

Paritosh, P.K. (2004). Symbolizing Quantity. In *Proceedings of the 26th Annual Conference of the Cognitive Science Society*, Chicago.

Making good estimates requires having good intuitions about quantities. The 2003 paper above raised questions about representation of quantities, how they are learnt, and how they are used in similarity comparisons. This paper presents CARVE, the computational model of *what* and *how* people learn about quantities. The argument is based on existing psychological and linguistic evidence. Representations generated by CARVE help BotE-Solver solve more questions and generate more accurate estimates.

Paritosh, P.K. (2006). The Heuristic Reasoning Manifesto. In the *Proceedings of the 20th International Workshop on Qualitative Reasoning*, Dartmouth.

This paper describes a research program based on my current work. It suggests that the problem of formalizing heuristic reasoning, the process of making educated guesses, is a solution to the brittleness problem in most software and presents a tractable approach to formalizing heuristic reasoning.