# EXCEL and PSPICE in Analog Circuit Design

## Purpose

EXCEL works to explore the algebraic solution of a circuit design problem. PSPICE serves as backup test, to see if the formulation is accurate. Many designs can take advantage of the approach, but a very simple one is used as an introduction.

## Why use software?

Many students lack confidence in their ability to do algebra and to interpret the resulting formulas. EXCEL allows them to explore the relations contained in their algebra through graphs, so they can see the trade-offs implied by their ideas. It provides instant graphical feedback: graphs immediately update to changes in values or formulas. Algebra is included as symbols, so formulas are easy to read. PSPICE verifies any example design done in EXCEL. Reliable verification is both necessary and reassuring where concepts and algebra may have errors.

## Why EXCEL and PSPICE?

A spreadsheet involves a small amount of learning overhead as most PC's already run EXCEL as part of the OFFICE suite of tools, and people already know how to use it. Thus, it's ubiquitous and has a fast learning curve.
PSPICE is a natural choice because it is a free program bundled with most circuit textbooks, and available free on-line as well. It is a commercial product that works well and incorporates its own graphing capability for large-signal and small-signal circuit response.

## My own experience

I found that a bit of organization speeds things up, and I developed a "standard" approach to these problems that sets up EXCEL pretty fast, and ties its results easily to PSPICE. The insight provided by the tool combination was greater than expected.

## Student experience

Students like the spreadsheet, especially in conjunction with design of circuits later to be built. They find their ideas can be explored easily once the spreadsheet is set up, and there is a lot of satisfaction in seeing the tool work and using it as part of design development. The combination of EXCEL and PSPICE also builds confidence in doing algebra and in converting ideas to mathematics. With this confidence, students become independent agents, ready to explore by themselves. Using EXCEL and PSPICE encourages initiative and development of new ideas from the beginning ones.