1003-35-539   **Mark A. Pierson*** (`mapiers2@math.vt.edu`), Department of Mathematics, 407 McBryde Hall (0123), Blacksburg, VA 24061. *Introduction to Partial Differential-Algebraic Equations.* Preliminary report.

Differential-algebraic equations (DAEs) arise naturally from many applications of ordinary differential equations (ODEs). To provide the necessary background, a short review will be presented on existence and uniqueness of solutions for the initial value problem of a DAE. Partial differential equations are often formulated as abstract Cauchy or evolution problems which we label "abstract ordinary differential equations" or AODEs. Using this abstract formulation, well-posedness of the problem is studied and discretization techniques are applied in order to obtain a numerical approximation to the solution of the AODE. Here we will look at AODE systems with additional constraint equations to formulate a "partial differential-algebraic equation" or PDAE problem. Well-posedness and numerical discretization of the PDAE problem is investigated. These results are applied to a structural dynamics problem. (Received September 21, 2004)