1003-35-623 **Elisa Francini** (`elisa@fi.iac.cnr.it`), CNR - IAC, Via Madonna del Piano, CNR Edificio F, 50019 Sesto Fiorentino, Italy, **Thomas Hoft** (`hoft@math.umn.edu`), School of Mathematics, University of Minnesota, Vincent Hall, 206 Church St SE, Minneapolis, MN 55455, and **Fadil Santosa*** (`santosa@math.umn.edu`), School of Mathematics, University of Minnesota, Vincent Hall, 206 Church St SE, Minneapolis, MN 55455. *An inverse problem in nondestructive evaluation of spotwelds.* Preliminary report.

Spotwelds are used in attaching metal sheets together. This method of joining sheet metal is especially common in the auto industry. There are more than 20 thousand spotwelds in a typical car, and they play a crucial role in the structural integrity of the vehicle. A thermal imaging method for nondestructive evaluation of spotwelds have been proposed. In this method, a transducer is employed to generate heat near the weld while skin temperature of the metal sheet is measured. The inverse problem is to access the quality of the weld from the temperature reading.

In this presentation, we develop a simple model for the thermal diffusion problem. The inverse problem we seek to solve amounts to finding a heat source in a 2-D domain given temperature as a function of space and time. We solve this classically illposed problem by devising a time-stepping algorithm which solves a regularized problem in each time step. Several regularization strategies are considered. We illustrate the main ideas of our work in numerical examples. (Received September 24, 2004)