1011-74-197 **Meir Shillor*** (shillor@oakland.edu), Department of Mathematics and Statistics, Oakland University, Rochester, MI 48309. *Models for Material Damage.*

We describe dynamic and quasistatic models for a process of evolution of damage in a body or a structure made of elastic or viscoelastic material. The material damage results from the appearance and growth of micro-cracks and micro-cavities caused by internal compression or tension, and leads to the reduction in the load carrying capacity of the structure.

The models are formulated either as an elliptic (quasistatic) or hyperbolic (dynamic) system of PDEs for the displacements coupled with a parabolic inclusion for the damage field. The existence of the unique local (in time) weak solution of the quasistatic problem is established by using approximate problems, a priori estimates and new comparison technique which leads to pointwise estimates on the damage function. These results allow us to remove the subgradient term in the inclusion for damage, thus transforming it into an equation, which leads to substantially more regular solutions.

A short discussion of the *demolished cores*, those sets consisting of totally damaged material, the analogues of 'dead cores' in reaction-diffusion equations, will be presented, as well as some open problems. (Received August 26, 2005)