1019-35-208 **Elena Cherkaev*** (elena@math.utah.edu), University of Utah, Department of Mathematics, 155 South 1400 East, JWB 233, Salt Lake City, UT 84112. *Min-max variational problem of optimal design.*

The talk discusses a min-max optimal design problem for the energy of an elastic structure. The problem is formulated as minimization of the principal compliance of the domain. The principal compliance is defined as the maximum of the energy of an external force, chosen over the set of all admissible forces. The minimum of the principal compliance is taken over the design parameters characterizing distribution of the elastic materials in the domain. This min-max design problem arises when the force acting on the boundary of the domain is unknown, only an integral constraint for the class of forces is given. It is shown that the problem for the principal compliance is reduced to an elasticity problem with mixed nonlinear boundary conditions. The minimization accounts for the possible multiplicity of extreme solutions of the maximization problem. Relaxation of the problem results in appearance of composites. Continuous change of the constraint for the set of admissible forces causes bifurcation of the solution. An invariance of the constraints under a symmetry transformation leads to a symmetry of the optimal design. The talk is based on a joint work with Andrej Cherkaev. (Received August 15, 2006)