**Meeting:** 1000, Albuquerque, New Mexico, SS 5A, Special Session on Categories and Operads in Topology, Geometry, Physics and Other Applications

1000-68-65 **Nikita A Sakhanenko*** (sanik@cs.unm.edu), Department of Computer Science, MSC01 1130, 1 University of New Mexico, Albuquerque, NM 87131-0001, **Hanna E Makaruk** (hanna_m@lanl.gov), Los Alamos National Laboratory, M319, Los Alamos, NM 87545, and **Robert M Owczarek** (rmo@lanl.gov), Los Alamos National Laboratory, J594, Los Alamos, NM 87545. *Graphs Applied in Theory of White-Box Software Testing.* Preliminary report.

Even though software complexity grew considerably during last years, testing of computer programs strongly relies on intuition and experience of a tester rather than on a systematic formal approach. White-Box testing is one of techniques devoted to test a program by executing all possible paths through it. Execution of each loop once is assumed to be sufficient. A testing method based on graph theory is proposed, which assures completeness of the White-Box test and minimizes the number of paths tested. It starts by representing a tested program as the action diagram in UML notation, which is further transformed into a directed graph. A virtual edge from End to Begin is added so as to produce a strongly connected graph. These steps can identify some software design errors. We show a simple way to choose independent paths candidates for the construction of the path space base, which number is equal to the cyclomatic complexity of the graph. Afterward, paths are represented as vectors over Z2: each edge is assigned 1 if visited during path traversal and 0 otherwise. Independence of paths becomes equivalent to easy-to-verify linear independence of the vectors. Above steps produce base paths, testing which provides complete White-Box testing. The approach is shown on a real-life. (Received August 11, 2004)