Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

The bond problem with an arbitrary percolation radius is solved!
VLADIMIR UDODOV, MARIYA BUREEVA, Katanov Khakas State University, KATANOV KHAKAS STATE UNIVERSITY TEAM — The results of investigations of main characteristics of a one-dimensional percolation theory (percolation threshold, critical exponents of correlation radius and specific heat) are presented for the problem of bonds and sites. It is shown that for a finite-size system the stability condition is fulfilled while the scaling hypothesis is inacceptable for one-dimensional bond problem. The correlation length exponent ν in a one-dimensional problem of bonds has been found to exceed the values of ν in the problem of sites for equal-length chains, and, in general, this exponent was found to be extraordinary large compared to the 2-D and 3-D cases for ordinary phase transitions in macrosystems. The scaling hypothesis is inapplicable to random (disordered) one-dimensional nanostructures containing hundreds of structural elements. The results obtained in this work can be used in modeling hopping conduction in semiconductors at low temperatures and polytype transformations in close-packed crystals. For the first time, using the method of computer simulation, we have solved the bond problem for the model of one-dimensional percolation in finite-size systems of tens of nanometers with an arbitrary percolation radius.

Vladimir Udodov
Katanov Khakas State University

Date submitted: 16 Nov 2010 Electronic form version 1.4