

# KOLLOQUIUM

Institut für Hydrologie, Albert-Ludwigs-Universität Freiburg



**05. Mai 2011, 16 ct – 18 Uhr**  
**Hörsaal Fahnenbergplatz (Rektoratsgebäude)**

**Prof. Dr. Allen Hunt**

Wright State University Dayton (USA)



## **Dispersion in porous media: calculation of distributions from first principles**

Using percolation cluster statistics and critical path analysis together it is possible to calculate the probability that a cluster of interconnected conductances with minimum arbitrary conductance,  $g$ , can provide a continuous solute transport path across a medium. The conductance statistics and the topological description of such clusters from percolation theory then gives the time of transit,  $t(g)$ . A fundamental identity from probability yields the distribution of solute arrival times. Analogous calculations give the spatial distribution at an instant of time. For a local conductance distribution that is monomodal and a single scale of imposed heterogeneity, varying the width of the distribution of local conductances yields results that describe almost exactly the range of observed dispersivity values over length scales from microns to 100 kilometers. The observed behavior of the variance of the Borden aquifer is obtained. Other factors also agree with experimental results. Some fundamental concepts of solute transport developed through stochastic methods are thereby called into question.