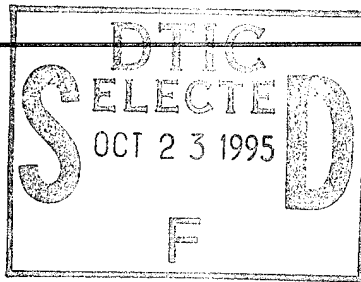




US Army Corps
of Engineers
Waterways Experiment
Station



Soil Mechanics Information

SMIAC
Analysis Center

Volume 95-5

September 1995

Discontinuous Deformation Analysis

A revolutionary method of analysis, developed for the solution of complex rock mechanics problems, may be applicable to a multitude of other problems, such as those encountered in the design of gravity dams, walls, and arches. Discontinuous Deformation Analysis (DDA) offers capabilities beyond that of finite element and distinct element methods. This new numerical model combines forward and backward analyses to accurately predict the behavior of block systems.

Input data for the forward model consist of block geometry, loading forces, deformability constants, and boundary conditions. Output includes the movements, deformations, stresses, and strains. The method uses displacements as unknowns and solves equilibrium equations in a similar manner as the matrix analysis of structures in the finite element method, although continuity at block boundaries is not implied. Elements can have any number of edges and can even contain holes. Block meshes do not require the vertex of one block to be in contact with the vertex of another. The analysis introduces a correction procedure that prevents both interblock penetrations and tension between blocks.

The forward model offers a close mathematical description of the real mechanical phenomena associated with block movements and can be used to support the design of tunnels, slopes, dam abutments, and foundations. The backward model works directly with time-dependent displacement, strain, or stress measurements at individual points to compute the continuous and discontinuous movement and deformation of entire block systems. Backward analysis can be used to compute deformability constants (Young's modulus and Poisson's ratio), initial stresses, and boundary conditions for further forward analysis to predict future states of stability.

Point of contact for this technology is Dr. Gen-Hua Shi, telephone 601-634-4657.

In This Issue

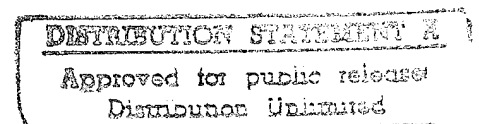
- Discontinuous Deformation Analysis
- REMR Bibliography Database
- Recent Publications
- International Forum on DDA
- Upcoming Events

A Department of the Army Information Analysis Center

The SMIAC bulletin is published and distributed periodically. Please contact the Director of SMIAC for more information:

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U.S. Army Engineer Waterways Experiment Station
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3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Phone: (601) 634-3376
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REMR Bibliography Database

The Repair, Evaluation, Maintenance, and Rehabilitation (REMR) Research Program offers a source of technical references for persons engaged in such activities. The database contains annotated references to REMR technical reports, technical notes, and material data sheets.

Internet users can access the database on the World Wide Web with the following URL protocol:

<http://www.wes.army.mil/cgi-bin/remr.wais.pl>

Point of contact is Roy Campbell, telephone (601) 634-2814.

Partial Listing of Recent Geotechnical Laboratory Publications

<u>Report No.</u>	<u>Date</u>	<u>Title</u>	<u>NTIS AD Number</u>
MP GL-S-73-1	07/95	State-of-the-Art for Assessing Earthquake Hazards in the United States; Report 29: Selection of Earthquake Ground Motions for Engineering	
TR GL-94-29	08/94	Normalization and Prediction of Geotechnical Properties Using the Cone Penetrometer Test	A285 193
TR GL-95-3	04/95	Backcalculation of Flexible Pavement Moduli from Falling Weight Deflectometer Data Using Artificial Neural Networks	A294 717
TR GL-95-5	05/95	Geophysical Survey at Cluster 6, Westwood Area, U.S. Army Aberdeen Proving Ground	
TR GL-95-6	05/95	Analysis of Soil-Track Interaction for Computer Program TVSTEER	B199 717
TR GL-95-7	05/95	Field Study of Load Transfer at Rigid Pavement Joints	B199 847
TR GL-95-8	06/95	Stochastic Vehicle Mobility Forecasts Using the NATO Reference Mobility Model, Report 3	
TR GL-95-9	06/95	LEVEEMSU: Analysis Software for Levee Underseepage and Rehabilitation	
TR GL-95-10	07/95	LEVSEEP: Analysis Software for Levee Underseepage and Rehabilitation	
TR GL-95-11	07/95	Comparison Between Finite Element Study and Simplified Analysis of Levee Underseepage	
TR GL-95-15	08/95	Site Investigation of Cluster 3, Edgewood Area, Aberdeen Proving Ground, Maryland	

The reports with AD numbers may be ordered from: National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; telephone (703) 487-4650. Please refer to the listed AD number.

International Forum on DDA

The First International Forum on Discontinuous Deformation Analysis (DDA) will be conducted at the Berkeley Marina Marriott in Berkeley, CA, from 12-14 June 1996. The objective of the forum is to bring together experts from around the world to share their experiences in applying DDA to solve practical engineering problems and discuss a basis for advancement of the method. Forum proceedings will be distributed to participants and attendees and will include a diskette containing a PC-version of the DDA program for two-dimensional analysis, which will be demonstrated in a tutorial workshop during the Forum.

Sponsored by the U.S. Army Engineer Waterways Experiment Station, the Forum is being organized by the University of California at Berkeley and North Carolina A&T State University. Information may be obtained by contacting:

Professor M. Reza Salami
 Department of Civil Engineering
 North Carolina A&T State University
 Greensboro, NC 27411
 Telephone: 919-334-7737

Upcoming Events

- September 25-27: Canadian Geotechnical Conference
 Vancouver, British Columbia
 Contact Brian Watts 604-279-4325

- October 4-6: Forum on the Manifold Method of Materials Analysis
 Jenner, CA
 Contact Jerry Hvie 601-634-2613

- October 24-26: Technology 2005 Conference and Exhibition
 Chicago, IL
 Contact Dorry Tooker 516-282-2078

- October 29-November 1: Society of Engineering Science 32nd Annual Meeting
 New Orleans, LA
 Contact Dr. D. Jui 504-865-5764

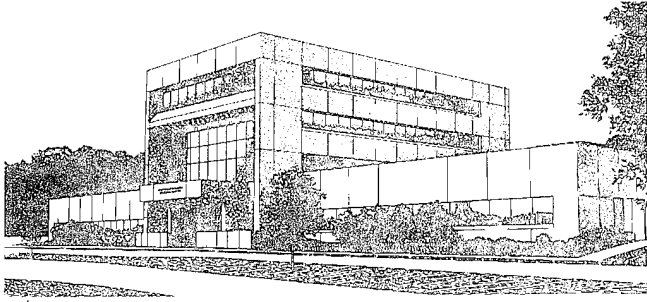
- October 29-November 3: 10th Pan American Conference on Soil Mechanics and Foundation Engineering
 Gadalajara, Mexico
 Contact Harvey Wahls 919-515-7244

- October 30-November 2: Defense Technical Information Center (DTIC) Annual Users Meeting
 and Training Conference
 Arlington, VA
 Contact Julia Foscue 703-274-3848

- November 13-16: Federal Laboratory Consortium Meeting
 Philadelphia, PA
 Contact Sharon DelaBarre 360-683-1005

- June 25-27: 20th Army Science Conference
 Norfolk, VA
 Contact Catherine Kominos 703-697-3558

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Director

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