

# Brief History of the Flat Plate Dilatometer in North America

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Abstract: This paper summarizes the development of the flat plate dilatometer in North America.

## 1. EARLY DEVELOPMENT

The dilatometer and dilatometer test (DMT) were developed in Italy by Dr. Silvano Marchetti. This paper provides a brief history of the dilatometer in North America

Prof. Marchetti fabricated the first dilatometer blade in 1974 at the L'Aquila University in Italy, over 30 years ago. Dr. Marchetti briefly described the dilatometer in 1975 at the ASCE Specialty Conference at Raleigh, North Carolina (see Marchetti (1975)). In 1980 he published a paper in ASCE that is still widely used as a primary reference for the DMT.

## 2. INTRODUCTION INTO UNITED STATES

Dr. Marchetti corresponded with Dr. John H. Schmertmann (formerly Professor of Geotechnical Engineering at the University of Florida) and encouraged him to include the dilatometer in his research and consulting practice. Preliminary DMT correlations looked promising. However, Dr. Schmertmann remained somewhat skeptical. This soon changed as explained subsequently.

Dr. Schmertmann retired from teaching and joined the author in 1978 to form Schmertmann & Crapps, Inc. to provide geotechnical consulting services. Dr. Marchetti provided equipment to Dr. Schmertmann for evaluation purposes in 1979. The author, assisted by Mr. William Whitehead (then a technician at the University of Florida (UF)), ran the first dilatometer tests in the United States at the University of Florida.

## 3. FIRST DMT USERS IN NORTH AMERICA

Within a short time after the first UF trial tests, Dr. Schmertmann received a consulting assignment to evaluate the consolidation characteristics of a clay layer beneath proposed cooling towers for a power plant in North Florida. The opinions meant the difference between a contractor bidding the project with a pile foundation or a shallow ring foundation. Dilatometer tests, made in August 1979, showed that the clay layer was overconsolidated, settlement would be within allowable limits and that a shallow foundation would be adequate. The contractor was the successful bidder. Several weeks after bidding the project, the contractor received the results of conventional consolidation tests which confirmed the conclusions made from the dilatometer results. Dr. Schmertmann and the author were both pleased with this first practical application of the dilatometer in the United States. They were enthused then and remain so many years later.

Schmertmann & Crapps, Inc. completed over 1,000 DMT tests during the soils investigation for the Sunshine Skyway Bridge across Tampa Bay, Florida. This was the first use of the DMT on a large project in the United States. The Sunshine Skyway Bridge is a 6.4 km (4 miles) long bridge with a 365.8 m (1,200 feet) main span, then a world record for cable stayed concrete bridges.

Mr. Ron Innis of Mobile Augers and Research, LTD and Mr. Jack Hayes of Site Investigation Services, LTD were the first users of the DMT in Canada. They were also very enthusiastic about the DMT. Mobile Augers and Research, LTD sponsored

the First International Conference on the Flat Dilatometer in Edmonton, Alberta, Canada on February 4, 1983 (see Mobile Augers and Research (1983). Mr. Hayes presented a paper at the first conference (see Hayes (1983)).

#### 4. EARLY RESEARCH IN NORTH AMERICA

Dr. Marchetti came to the University of Florida in Gainesville, Florida as a Visiting Professor in the Fall of 1980 and remained until early summer of 1981. Dr. Marchetti presented a paper on the dilatometer to the Florida Section of ASCE on September 12, 1980. The first dilatometer research in the United States was at the University of Florida under the direction of Dr. Marchetti. By February 1983, research was also actively underway at Clarkson University (Potsdam, NY) and the University of British Columbia. Purdue University, Louisiana State University, North Carolina State University and Carleton University in Ottawa, Canada followed soon thereafter (see Schmertmann (1983)).

#### 5. PROMOTION OF DMT IN NORTH AMERICA

Dr. John H. Schmertmann headed an S&C research project sponsored by the Federal Highway Administration (FHWA) and the Pennsylvania Department of Transportation (see Schmertmann (1983)) which provided a report used by many as a manual for the DMT and its practical applications. The FHWA later sponsored a project to develop an updated manual for the DMT (see Briaud and Miran (1992)). The intent of both these projects was to encourage the use of the DMT in the United States.

GPE, Inc., a sister of company of Schmertmann & Crapps, Inc., worked with Dr. Marchetti to provide an outlet for the dilatometer in North America. The author assisted Dr. Marchetti in preparing the first English version of a manual for the DMT (see Marchetti and Crapps (1981)). GPE, Inc., located in Gainesville, Florida still markets the DMT in North America.

#### 6. US STANDARDS & GROWTH

In 1986 a "Suggested Method for Performing the Flat Dilatometer Test" was published by ASTM (see Schmertmann (1986)). Dr. Paul Bullock (then with Schmertmann & Crapps, Inc. and with the University of Florida at the time of its adoption) worked intently with ASTM Subcommittee 18.02 to establish a standard for the dilatometer. The suggested method was revised and the dilatometer standard (D6635) became official in 2002 (see ASTM (2002)).

Growth in the use of the dilatometer in North America has been steady; but, slow when one considers the wealth of information provided by the DMT at a reasonable cost. Dr. Marchetti's web site (see [www.marchetti-dmt.it](http://www.marchetti-dmt.it)) shows that there are presently about 210 users world-wide with about one-third of them in the North America. Several hundred technical papers have been written about the DMT. Dr. Marchetti's web site also has key references of interest concerning the dilatometer.

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