

ISSMGE TC201

Geotechnical Aspects of Dykes and Levees and Shore Protection

Newsletter February 2021

Dear TC201 members,

This is the nineteenth newsletter of the ISSMGE Technical Committee 201: Geotechnical Aspects of Dykes and Levees and Shore Protection. The intention of the newsletter is to keep all members informed on coming activities of our TC201 and the ISSMGE.

Cor Zwanenburg (Chairman TC201)

Norma Patricia López-Acosta (Secretary TC201)

In memoriam

It is with the deepest regret that we have to inform you that Dr Maria Elisabeth Pardini has passed away. We will remember her as enthusiastic member of our TC201. Among others, she was the driving force behind the successful workshop our TC held at the Panamerican Conference on soil mechanics and geotechnical engineering, Buenos Aires, Argentina in 2015.

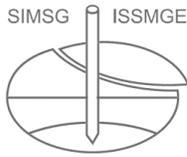


1. Announcement of TC201 activities during the 20th ICSMGE-2022 (Sydney, Australia)

As you would be aware, because of the COVID-19 pandemic, the Advisory Committee of the 20th ICSMGE agreed to postpone the Conference from May 1 to 5, 2022, in the hope that international travel restrictions will have eased sufficiently by that time to allow most delegates to attend in person. That means that our workshop and our annual meeting will also be postponed until that date. Therefore, we notify you that during the 20th ICSMGE-2022, the TC201 will organize:

- A pre-conference workshop.
- A conference session.
- Our annual meeting.

In the meantime, we will have a virtual TC201 meeting via Microsoft Teams (please see details in Section 3a of this document).



2. Field trip to water retaining structures in Australia (additional activity during the 20th ICSMGE-2022)

The Technical Committee ISSMGE TC201 in collaboration with ICSMGE LE TC are organizing a field trip to water retaining structures in Australia. The idea is to organize a field trip either in advance or in addition to the conference. The field trip should deal with the topic of TC201 (dikes and levees) or more general protection against flooding. We expect Australia to have more experience with behaviour water retaining structures during dry periods and the first high water / rainy period after that than Europe and North America. This climate issue might be a theme for this field trip. Please all your ideas and opinions are very welcome about this field activity. Send your opinions to cor.zwanenburg@deltares.nl or/and nlopeza@iingen.unam.mx.

3. TC201 events during 2021

3a) Virtual TC201 meeting

We will have an online TC201 meeting via Microsoft Teams on Tuesday June 15th, 2021 (7:00 h Mexico/ 14:00 h Delft/ 22:00 h Seoul). You are all cordially invited. The link to the videoconference will be provided well in advance.

3b) Update on the failure path report (a joined document for water retaining structures)

At the last TC201 meeting in Reykjavik we introduced the initiative to write a TC201 document on failure paths for water retaining structures. Then, we announced that we would like to have your input on this. To have some introduction and guidance, we prepared a draft document with the working title “Failure paths for levees”.

This document provides some background and definitions of the used terminology in chapter 1, will provide an inventory of case histories in chapter 2 and an inventory of specific failure trees or paths for different mechanisms used.

We would like to ask you the following questions regarding the use of failure paths for levees:

- Are there interesting case histories in your country or working environment of a levee failure that is or can be described by a failure path, as discussed in chapter 2? In addition, if so, could you share this case history with us?

- Do you, or other specialists in your country, use specific failure trees or failure paths involving different mechanisms, as discussed in chapter 3 and could you contribute to this chapter?

We intend to discuss a draft version of the report in our TC meeting June 15th 2021 and introduce the final document during the 20th ICSMGE in Sydney from May 1 to 5, 2022, in which TC201 will organize a pre-conference workshop, a conference session and our annual meeting. If you see possibilities to help us further could you send a short reply in which you indicate that you have the intention to join this initiative to cor.zwanenburg@deltares.nl. If you have any further questions, please contact cor.zwanenburg@deltares.nl (on behalf of the editorial board; Esther Rosenbrand, Rémy Tourment, Philip Smith and Meindert Van).

The purpose of design, assessment and maintenance of levees and embankments is to avoid a breach and flooding. Flooding happens when a sequence of events occurs that cause damage, deterioration and/or failure of one or more components of the levee and ends by a breach in the levee. Such a sequence of events is called a failure path. Failure paths are the result of an analysis in order to identify the possible mechanisms by which a levee may fail and to identify which characteristics of the levee and its environment influence the occurrence of these. Failure paths can be constructed based on event tree analysis or fault tree analysis or forensic analysis of actual failures. Assessment of the probability of occurrence of each event in the failure path can be used to assess the probability of failure of the levee as a whole. Besides assessment, failure path analysis can also be used for design, and also to devise an effective a maintenance protocol and emergency response measures.

ISSMGE TC201¹ is working on a report on the use of failure paths, failure trees, event trees, fault trees and bowtie trees for levees around the world. This report inventories examples of failure paths and application of failure analysis for levees and embankments. Failure paths that are constructed based on case histories are one important component of the report. An inventory of case histories is made in order to identify critical failure mechanisms or combinations of mechanisms that commonly lead to failure.

For embankment assessment and design, it is common to consider failure mechanisms such as external erosion, internal erosion and sliding collapse, and failure paths have been derived based on theory for such mechanisms. An example is the failure path for the internal erosion mechanism of backward erosion piping, which is shown below. Failure paths derived based on theory can differ in the level of detail of the steps that are included, these differences often reflect differences in the level of knowledge that is available regarding the failure path. Therefore, an inventory is also made of the use of such

¹ <https://www.issmge.org/committees/technical-committees/applications/dykes-and-levees->

‘theoretical’ failure paths derived for such specific ‘failure modes’. An inventory of these paths therefore aids in identifying best practice, as well as knowledge gaps.

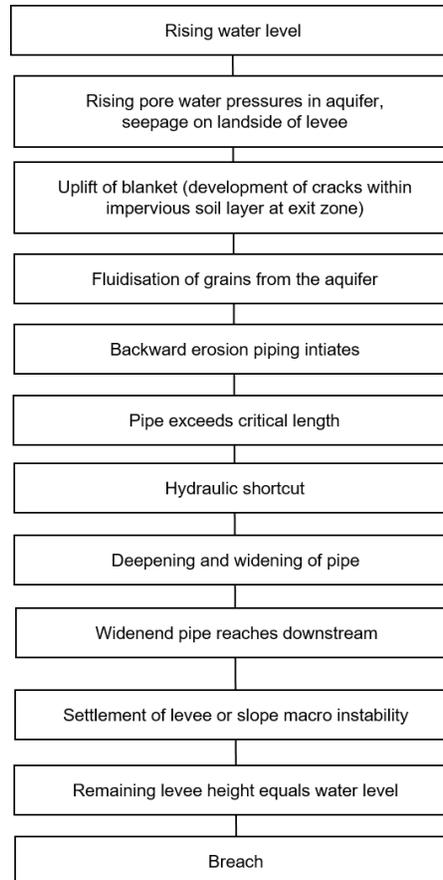
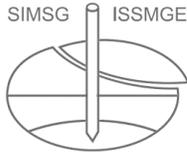


Figure 1. Example of a theoretical failure path for the internal erosion mechanism of backward erosion piping.

A limitation in many failure paths oriented in detail at specific mechanisms is that the relation to other events or mechanisms that may occur simultaneously and affect these is often missed. Therefore, failure trees, which are a collection of failure paths which also show relations between mechanisms, form an important part of the report.

4. Online meeting EWG-IE 2020 “Internal erosion at the field scale” (Thursday February 4, 2021, 4.00-7.00 pm CET)

Due to the Covid-19 pandemic, the annual meeting of the European Working Group on Internal Erosion (EWG-IE) has been replaced by a series of online meetings. This working group, which was set up in 1993 and is linked to the ICOLD Technical Committee on Embankment Dams, consists of internal erosion experts and scientists from over 30 countries in Europe and all other countries. The group facilitates knowledge



exchange knowledge between practitioners and scientists, and between experts, young engineers and researchers.

Deltares will organize the third meeting in this series, together with Delft University of Technology and Ghent University. The meeting is open for anyone interested and will be held at February 4, 2021, from 4:00 to 7:00 pm (CET). The topic of this meeting is “Internal erosion at the field scale”.

More information can be found in the enclosed announcement. Details regarding the program and access to the meeting will be provided approximately one week before the meeting. If you have any further questions, please contact *Esther Rosenbrand* (Esther.Rosenbrand@deltares.nl).

5. Next TC201 Newsletter

The next newsletter will be sent in July. Please provide all available information, like TC related publications, academic papers, news, research, among others, to the Secretary TC201 *Norma Patricia López-Acosta*, nlopeza@iingen.unam.mx