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DE ENGENHARIA CIVIL

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RADE – First Experiences on Data Sharing Using Remote Access

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LABORATÓRIO NACIONAL
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RADE – First Experience on Remote Access in Data Acquisition

1 INTRODUCTION

The present report describes a laboratory experience on image streaming and data remote access during physical model tests for a 2D model, performed at the COI1 flume on the 22nd of November, and for a 3D model, performed at the TOI2 tank on the 5th of December 2012.

The HYDRALAB IV project and, in particular, RADE project were previously described in Capitão *et al.*, 2012, Fortes *et al.*, 2012 and Lemos *et al.*, 2012. In these reports, the aim was to demonstrate how one could remotely access video streaming during laboratory experiments, both at a flume (2D model) and at a tank (3D model). In this report, however, the aim is to demonstrate how one can also visualize real-time acquisition data coming from a physical experiment and also how to enable communication between partners as to share results of those experiments.

After the objectives (Section 2), Section 3 of the present report describes the experiences made at the COI1 flume (for a 2D model), while Section 4 describes the experiences at TOI2 tank (3D model). In Section 5, final comments and future work are presented.

2 OBJECTIVES

The objective of the work reported in this document is to describe a methodology for remote visualisation of data acquisition during scale model tests. The laboratory experience took place at COI1 wave flume and at a tankon the maritime hydraulic installations of the Harbours and Maritime Division (NPE).

The 1st experience took place at the COI1 flume while, aiming to test a remote access and on-line meeting software. During the 2nd experience, which took place at the TOI2 tank, both video decoding and streaming image was tested, as well as and also data acquisition remote access. During the second test, two researchers from the public department related with harbour issues and maritime transportations, IPTM (Instituto Portuário de Transportes

Marítimos) and CONSULMAR company in Lisbon (Portugal) were invited to remotely access the experience.

3 DESCRIPTION OF THE EXPERIENCES

3.1 COI1 flume

COI1 flume (Figure 2) is a wave flume mostly used for studying propagating waves over a variable bed and their interaction with a maritime structure. With this setup one is capable of generating both regular (periodic) and irregular (random) waves with real-time active wave absorption of reflected waves. Its characteristics were already described in previous reports of this series.

Figure 1 - COI1 flume.

3.2 TOI2 tank

TOI2 is a wave tank used for studying directional irregular waves over a variable bed and their interaction with a 3D maritime structure. An overview of this tank is shown in Figure 2**.** No wave absorption system exists in this tank.

Figure 2 - Overview of the TOI2 tank

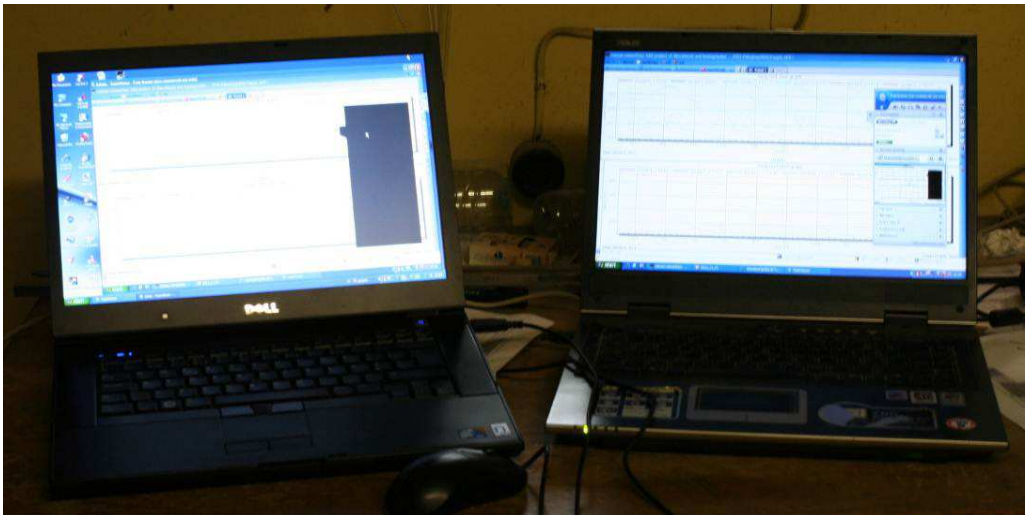
3.3 Physical Equipment

3.3.1 *First experience on remote visualization of data acquisition*

The equipment necessary to accomplish this experience was, Figure 3:

- Two laptop computers with the following characteristics:
    - Make and model: Dell Latitude E6500 - Intel Core 2 Duo Processor T9600 (2.8GHz, 1066MHz FSB, 3GB RAM)
    - Make and model: ASUS - Intel Pentium (2.0 GHz, 797 MHz, 1 GB RAM)
- Data acquisition system with the following main characteristics:
    - Make and model: HBM Spider8 data acquisition board, enabling simultaneous measurement acquisition in eight channels with high sampling rate at 16-bit resolution and delectable digital filters.

a)



b)

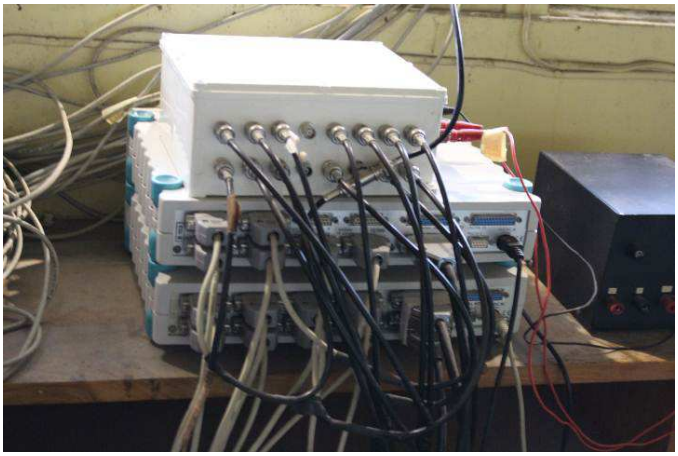


Figure 3 - Physical equipment. a) Laptops (Dell on the left; Asus on the right); b) HBM Spider8 data acquisition system

3.3.2 *Second experience (TOI2 tank)*

The equipment needed for this experience was, Figure 4 and Figure 5:

- Camera with the following characteristics:
    - Canon 600D digital camera with video capabilities: PAL 720p, 25 fps and a lens with fixed 50 mm focal distance and 1.5/f aperture.
- Two laptop computers with the following characteristics:
    - Make and model: Dell Latitude E6500 - Intel Core 2 Duo Processor T9600 (2.8GHz, 1066MHz FSB, 3GB RAM)
    - Make and model: ASUS - Intel Pentium (2.0 GHz, 797 MHz, 1 GB RAM)
- Data acquisition system HBM Spider8, enabling simultaneous measurement acquisition in eight channels with high sampling rate at 16-bit resolution and delectable digital filters.
- Video acquisition hardware
    - Conceptronics CHVIDEOCR A/D Convertor DAQ board with provided cables
- Flexible tripod “Joby Gorillapod SLR Zoom”

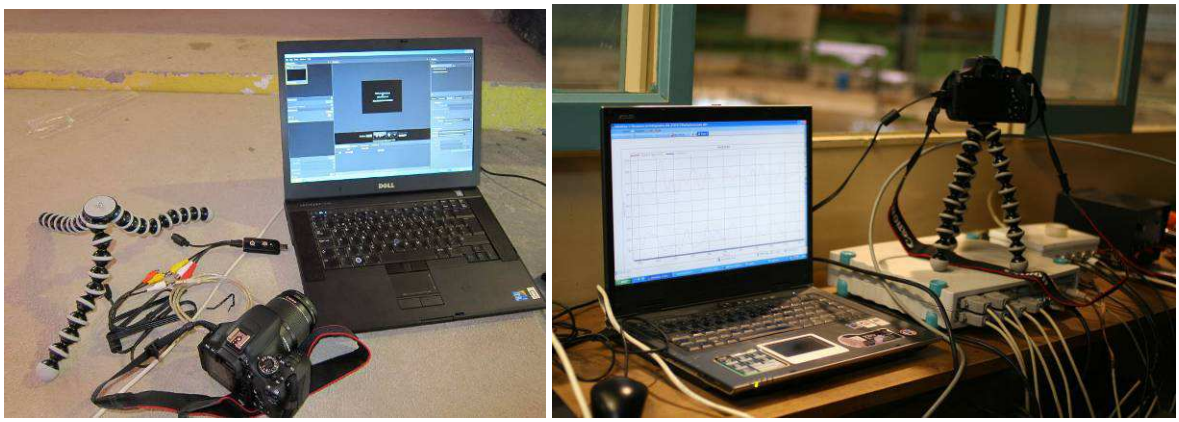


Figure 4 - Physical equipment used for the second experience.

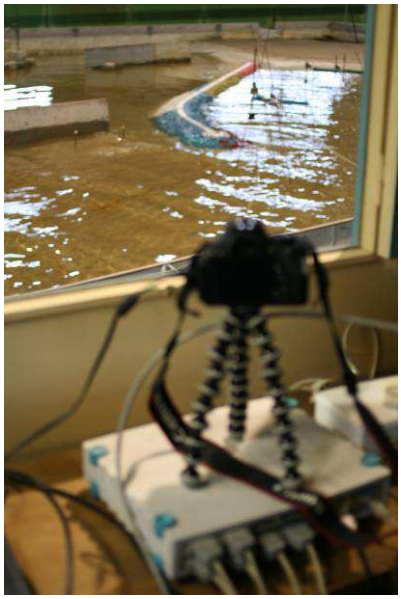


Figure 5 - TOI2 tank. A side view from the installed setup.

3.4 Software

The software used in the **video decoding and streaming** was the Microsoft's Expression Encoder 4 (free version) [1], [2], [3]. Encoding was established with the following video and audio characteristics:

1. Video 25 fps, 1000 Kb/s
2. Audio 128 Kb/s (2-channel 16-bit 48 kHz)

A free version of this software was used in all experiences (Figure 6) as occurred with experiments reported in Capitão *et al.*, 2012, Fortes *et al.*, 2012 and Lemos *et al*., 2012.

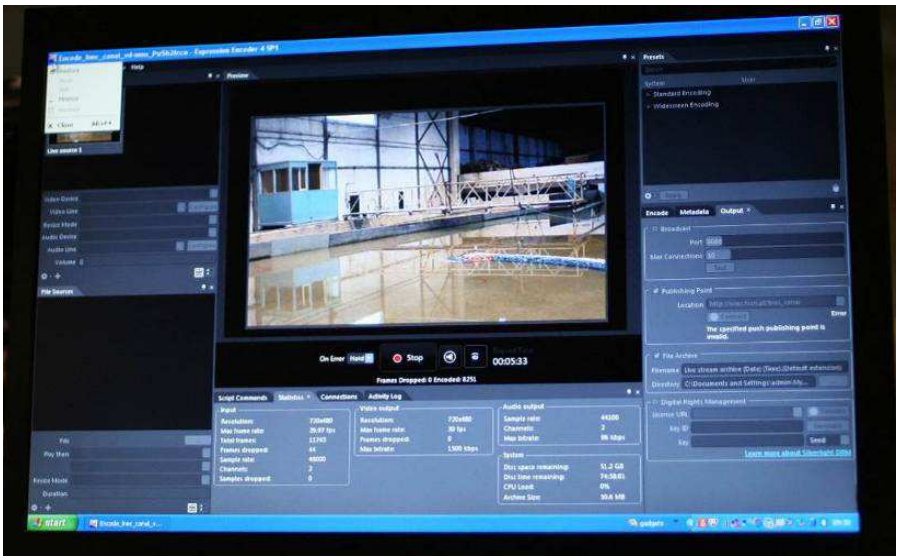
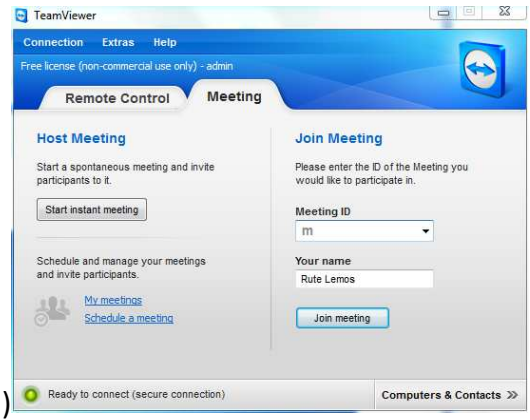


Figure 6 - Software equipment.

For the **remote visualisation of data acquisition**, the "all-In-one" software for remote support and online meetings TeamViewer was used. This software also enables the remote control of client computers via the internet, through a password-coded session provided by the client computer, Figure 7.

a) 

b)

Figure 7 - TeamViewer initial window. a) Meeting b) Remote control

3.4.1 *Software setup*

Teamviewer can be downloaded at:

http://www.teamviewer.com/en/download/windows.aspx

- If you are hosting the meeting the *All-In-One TeamViewer full version* shall be downloaded. This download can establish connections as well as wait for incoming connections (Figure 8);

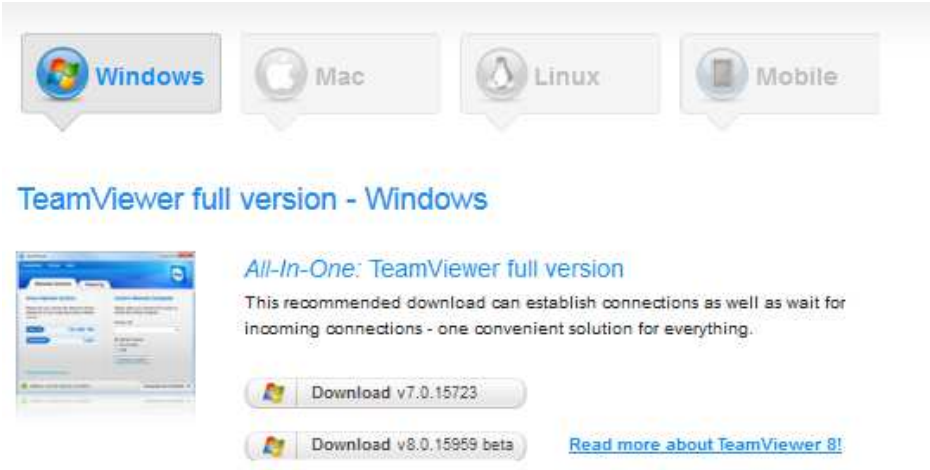


Figure 8 - Free download of *TeamViewer full version.*

- If you are the instant client, you should download TeamViewer Quick Support, a small costumer module which does not require administrative privileges (Figure 9).

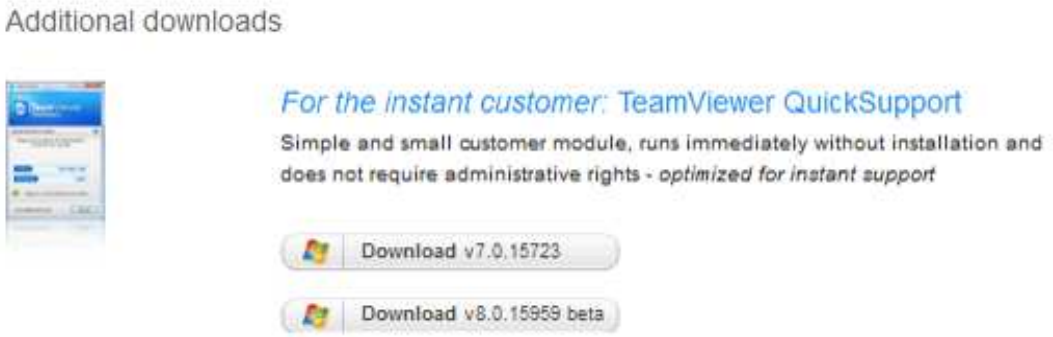


Figure 9 - Free download of *TeamViewer QuickSupport*

Selecting the setup icon *TeamViewer_Setup_pt-dix.exe*, you will be conducted to the setup window (Figure 10).

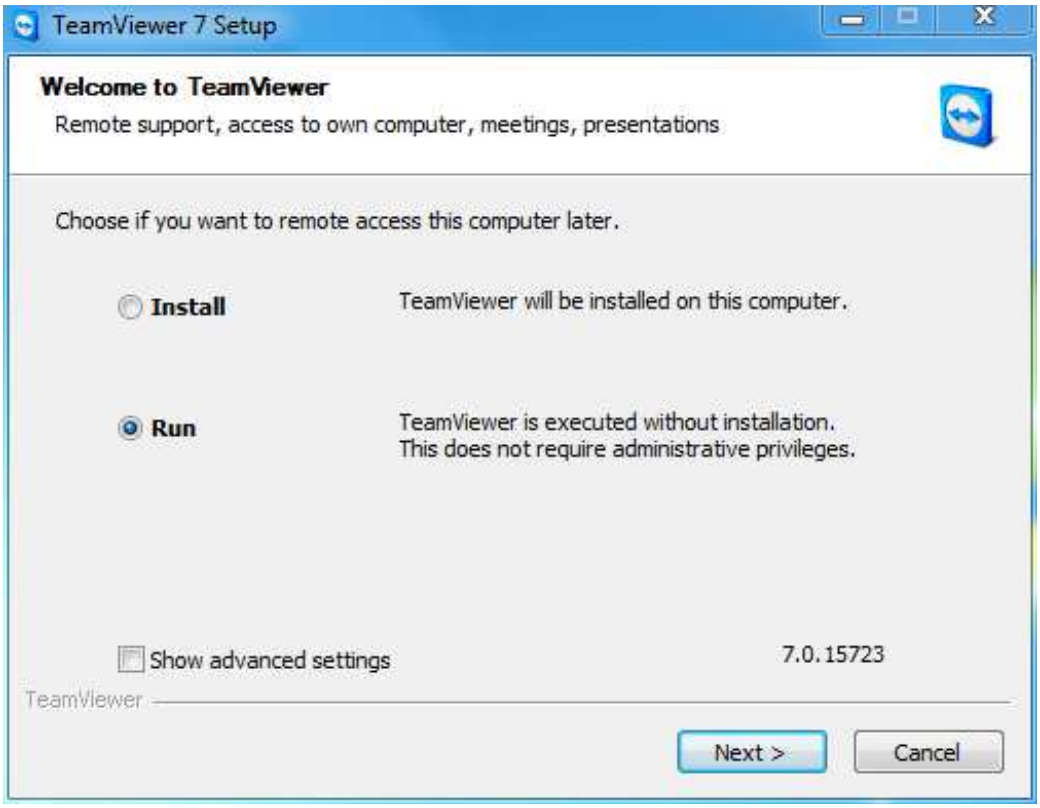


Figure 10 – *TeamViewer* setup window

Here, the user can choose the option ”install” or “run”. Selecting the first option, it will install TeamViewer on the computer. Clicking the *TeamViewer* icon (Figure 6) it will lead the user to its initial window (Figure 11).

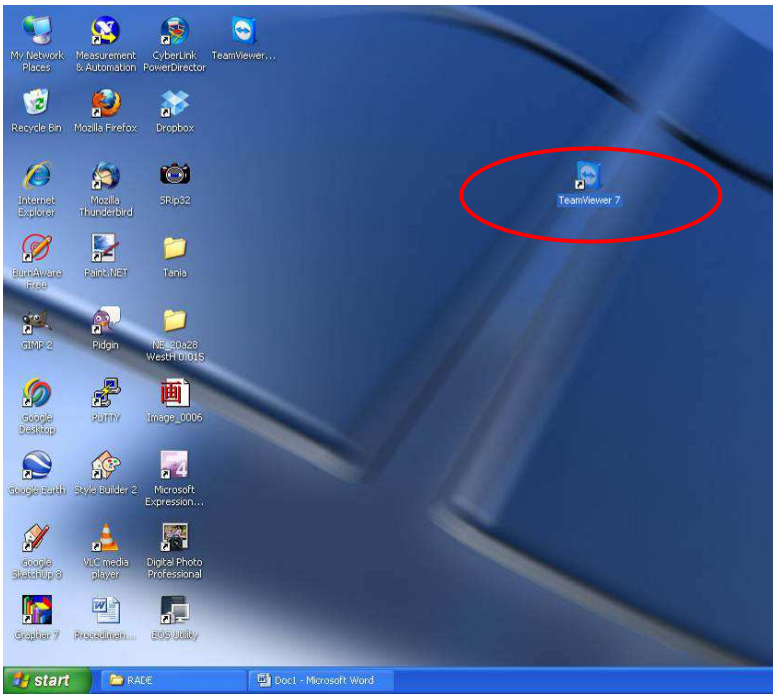


Figure 11 – Executing *TeamViewer*

Alternatively, by choosing “run”, the TeamViewer will be executed without installation and no administrative privileges will be required, Figure 12.

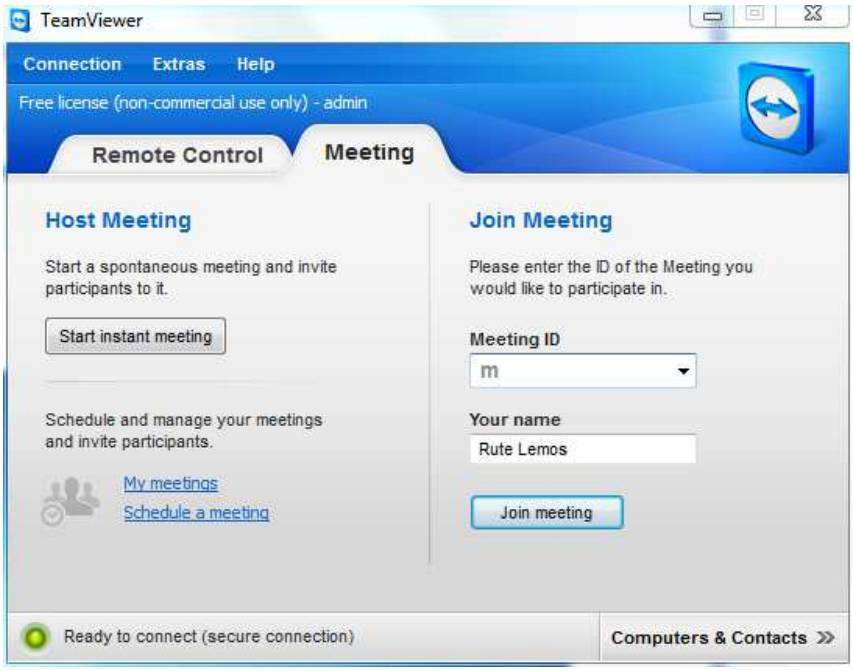


Figure 12 - TeamViewer initial window

3.4.2 The *Remote Control* Feature

The host user is able to remotely control his partner's (client) computer (as long as the partner allows it), by entering his ID, selecting the option connect to partner (Figure 13and then entering the password provided by partner (Figure 14).

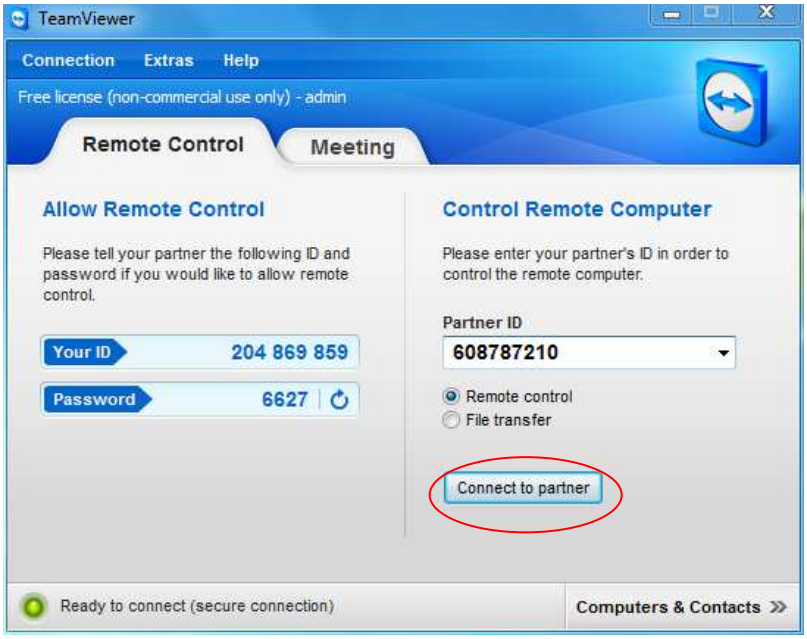


Figure 13 - Connecting to a partner

Figure 14 - Team Viewer authentication.

The correct authentication will open a window with the partner´s desktop, where the host will be able to perform remote maintenance, spontaneous support, access to unattended computers, home office, online meetings, presentations, training sessions and team work (Figure 15).

Some of the features listed in the bar on the top of this window are only available for the host participant, as rebooting a remote computer, record the session, take screenshots or switch sides with a partner enabling him to access its computer and lead the session.

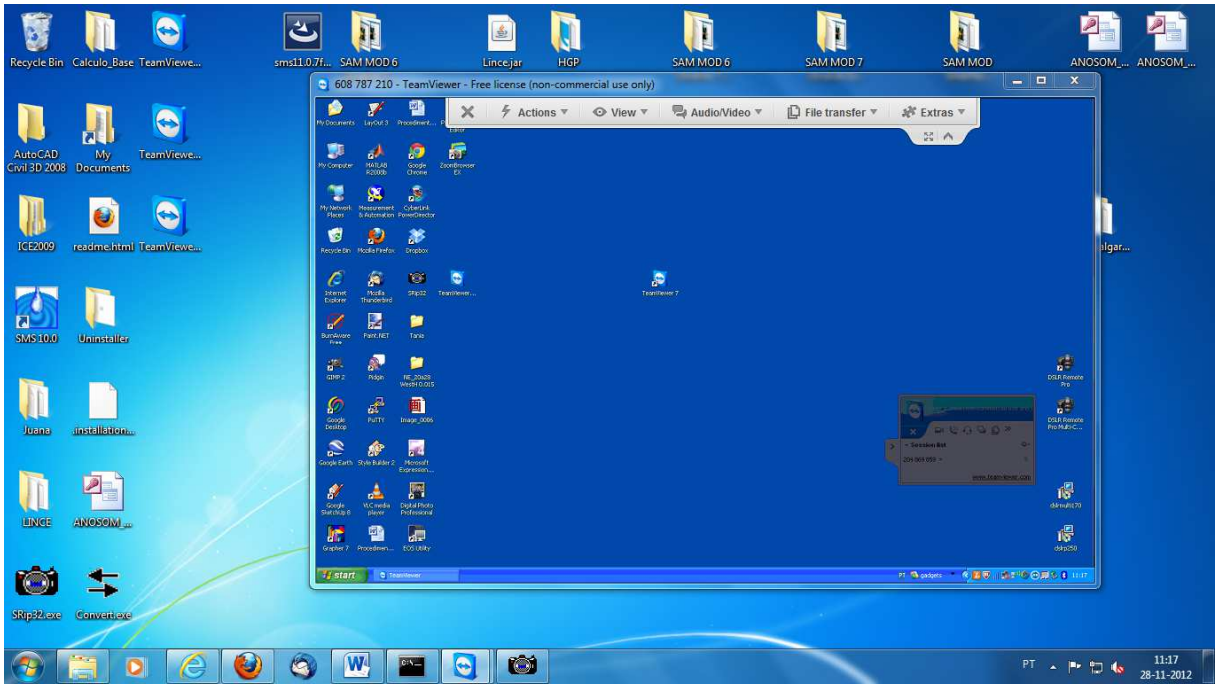


Figure 15 - Host accessing a partner desktop

All the features listed in the session panel (Figure 16) are available for all the participants and include:

- All the participants can see and hear each other. During a meeting, they are connected via **Voice over IP** and **web cam;**
- Using the **conference call** feature, the host participant can call participants at different locations during the meeting, using the integrated teleconferencing number or send out your own teleconferencing data using an invitation;
- It is possible to present a movie by connecting a camera to the PC;

- With instant messaging (**chat**) messages can purposefully be sent to individual persons or to all the participants;
- All the participants can easily copy files or entire folders to and from the remote computer, both using the **file box** or simply using the drag & drop feature (Figure 17);

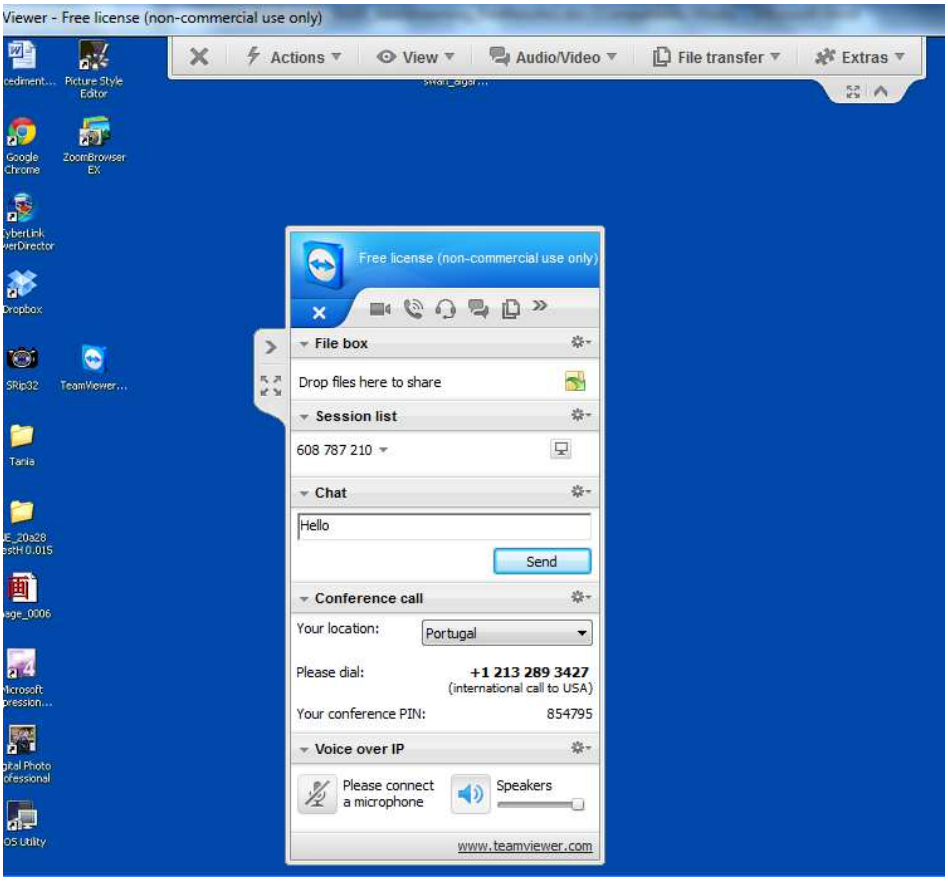


Figure 16 – Features presented in the Session Panel

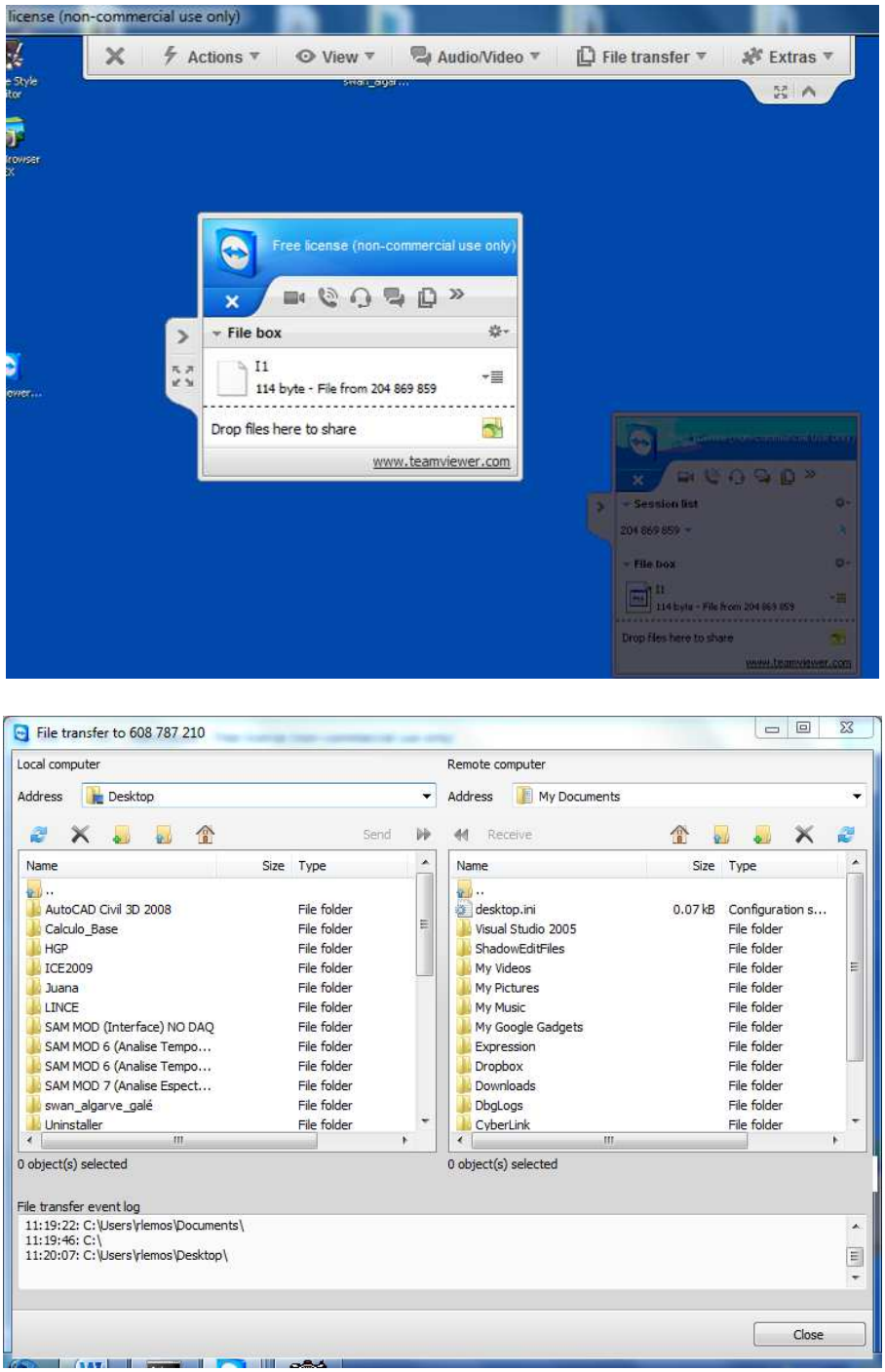


Figure 17 - Transferring files using the file box or the drag and drop feature

3.4.3 The meeting feature

The meeting feature can be started from the TeamViewer initial window. The host of the meeting only need to choose “Start Instant Meeting” (Figure 18).

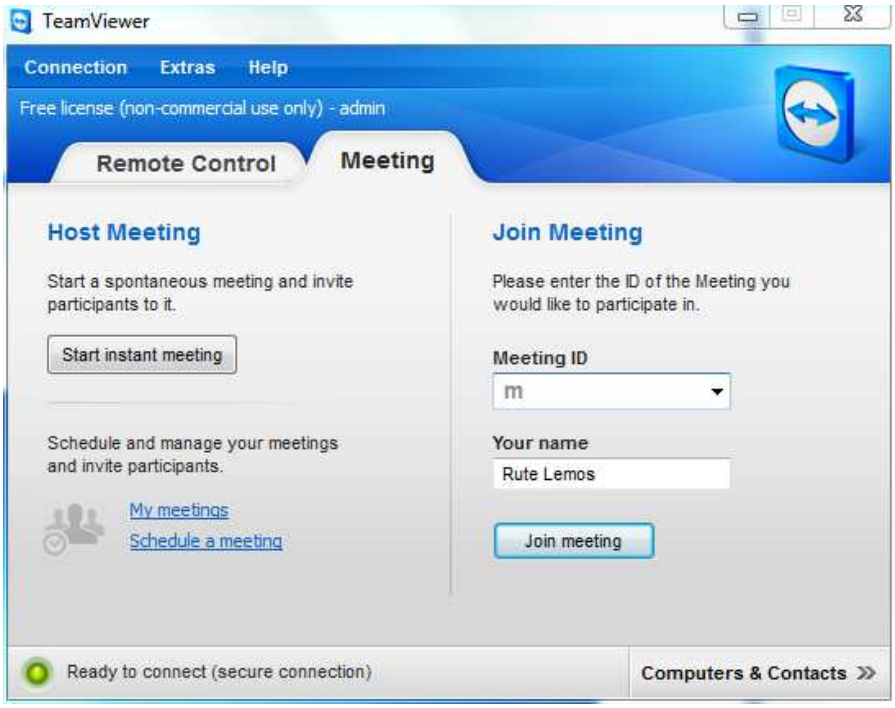


Figure 18 – TeamViewer inicial window

This action will open the session panel (Figure 19). By choosing “invite”, the host will be able to send an e-mail with a link to select all participants in order to instruct or conduct them to the meeting.

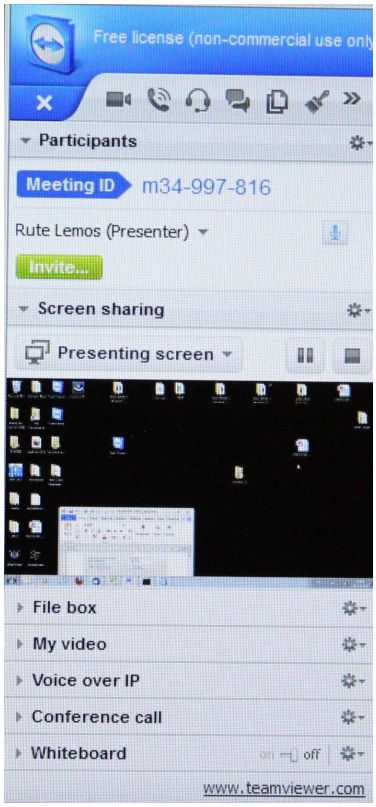


Figure 19 - Session panel

3.5 *Description of the Experiences*

3.5.1 *Remote Visualization of Data Acquisition at COI1*

This experience aimed to test the meeting feature for remote visualisation of data acquisition during a scale model test in the COI1 flume. During the experience, the following steps were taken:

1. Connection of data acquisition system (spider8) to the "host" laptop and starting the Computer (Figure 20);

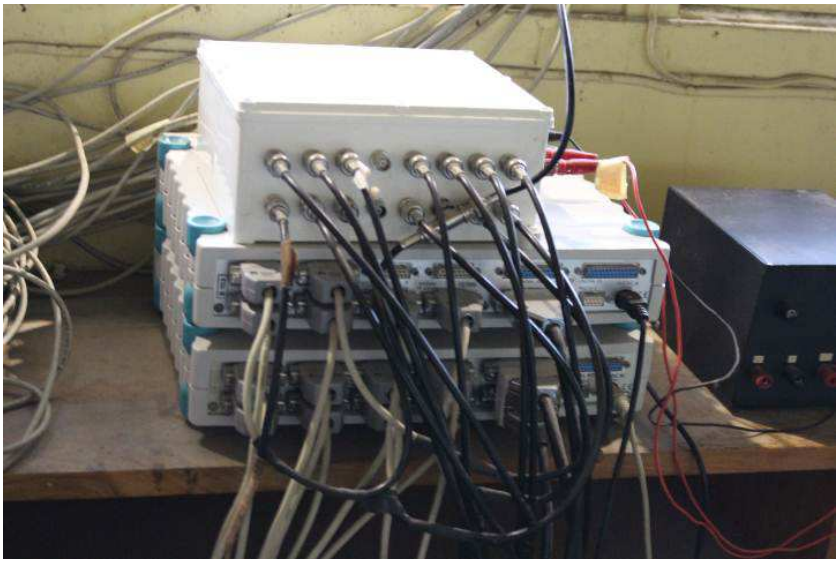


Figure 20 - Data acquisition system (HBM Spider8) modules and terminal connection's box

2. Running the proprietary data acquisition software (HBM CatmanEasy) (Figure 21)

Figure 21 – Running the HBM CatmanEasy software

3. **Starting the meeting**: The meeting started with the host of the meeting clicking "Start Instant Meeting", which opens the session panel. The host shall invite the participants by clicking "Invite" (Figure 22).

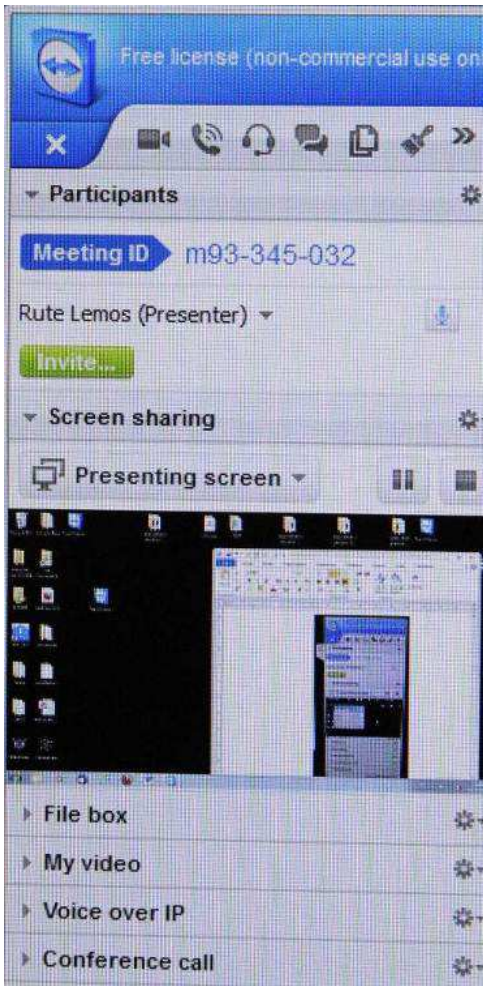


Figure 22 - Session panel

This action will open an invitation window (Figure 23).

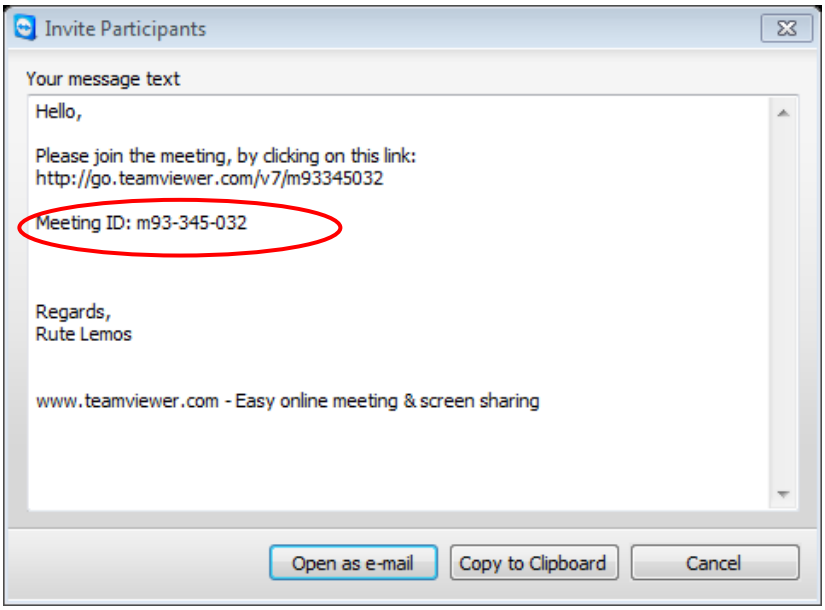


Figure 23 - Invitation window

Selecting "open as e-mail", the host can add all the participant contacts providing them a link that will conduct them to the session (Figure 24).

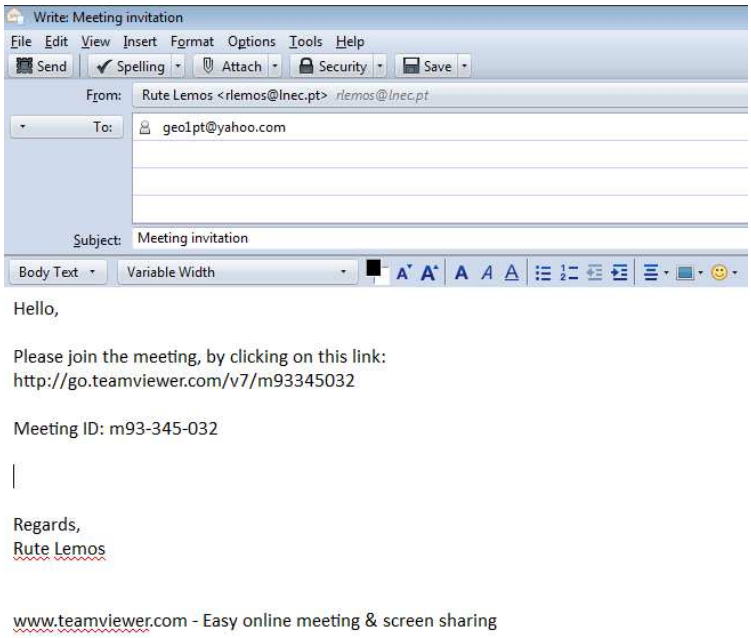


Figure 24 - Invitation e-mail.

4. **Participants joining the meeting**: If necessary, i.e. for clients with Temviewer not installed, clicking the link provided by e-mail (Figure 25), *TeamViewer QuickSupport* for instant costumer will be automatically downloaded on the participants PC's. (Figure 26).

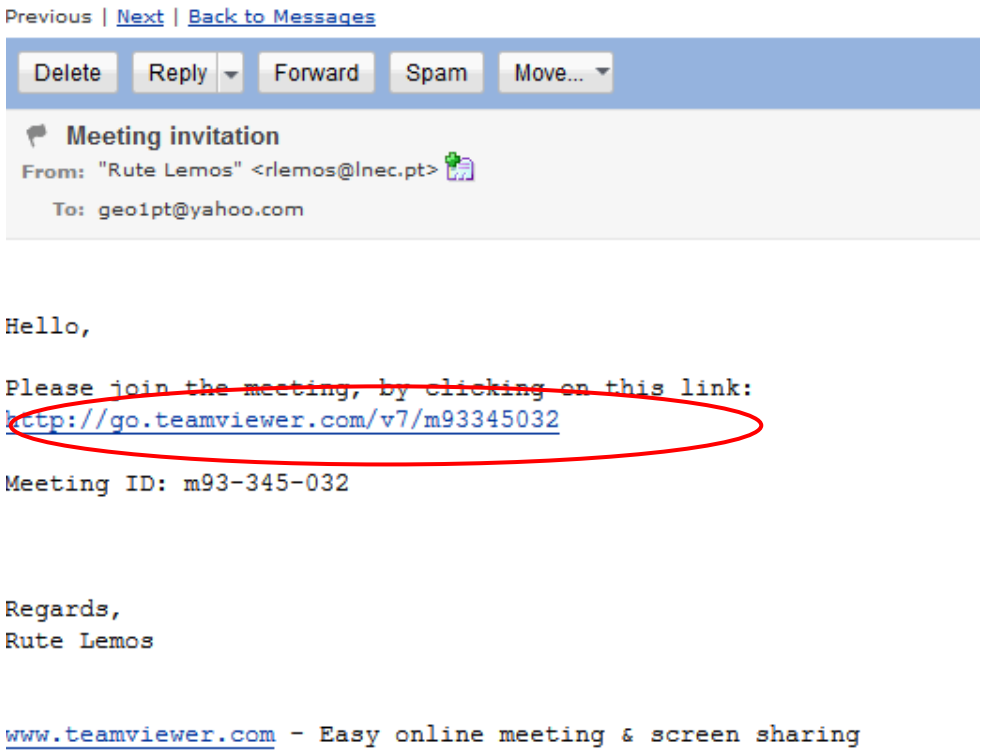


Figure 25 – Meeting invitation received by participants

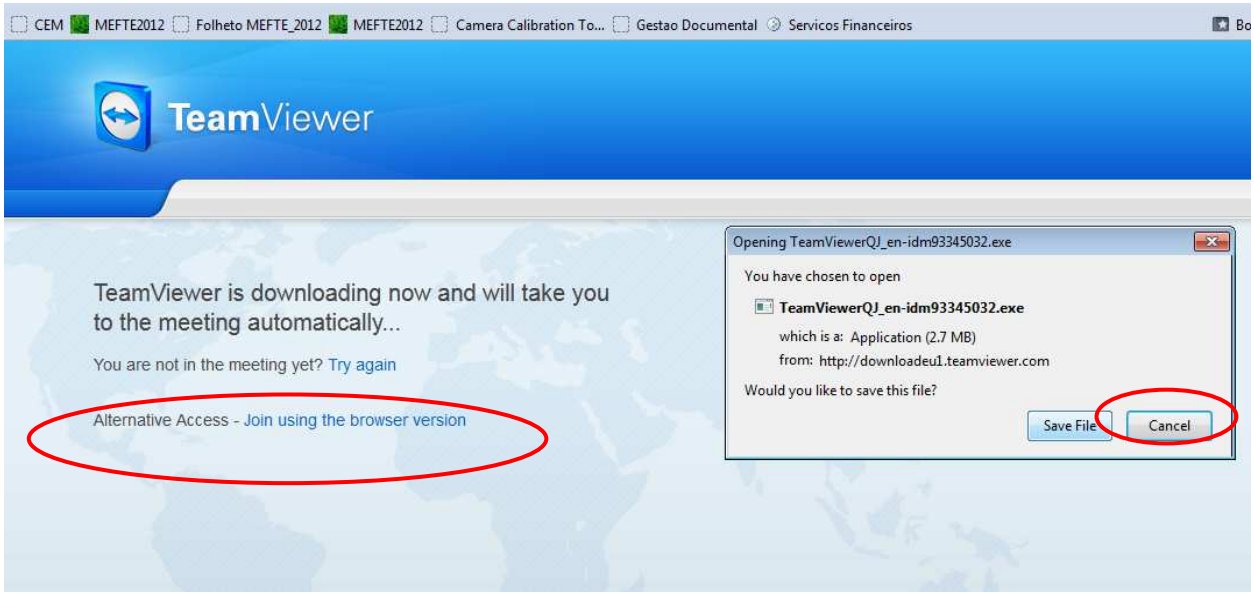


Figure 26- Automatic download of *TeamViewer QuickSupport*

- **Saving the ".exe file"** or clicking in the "join using the browser version" link, participants will be immediately conducted to a joining session window. Clicking "Join" (Figure 26) enables to access the host desktop (Figure 27).

Figure 27 - Joining session window

5. **Activation of the wave generator at the flume in order to produce waves.**

6. **Starting data acquisition**. All the joined meeting participants were by now allowed to visualize the host desktop and remotely access the test progression (Figure 28).

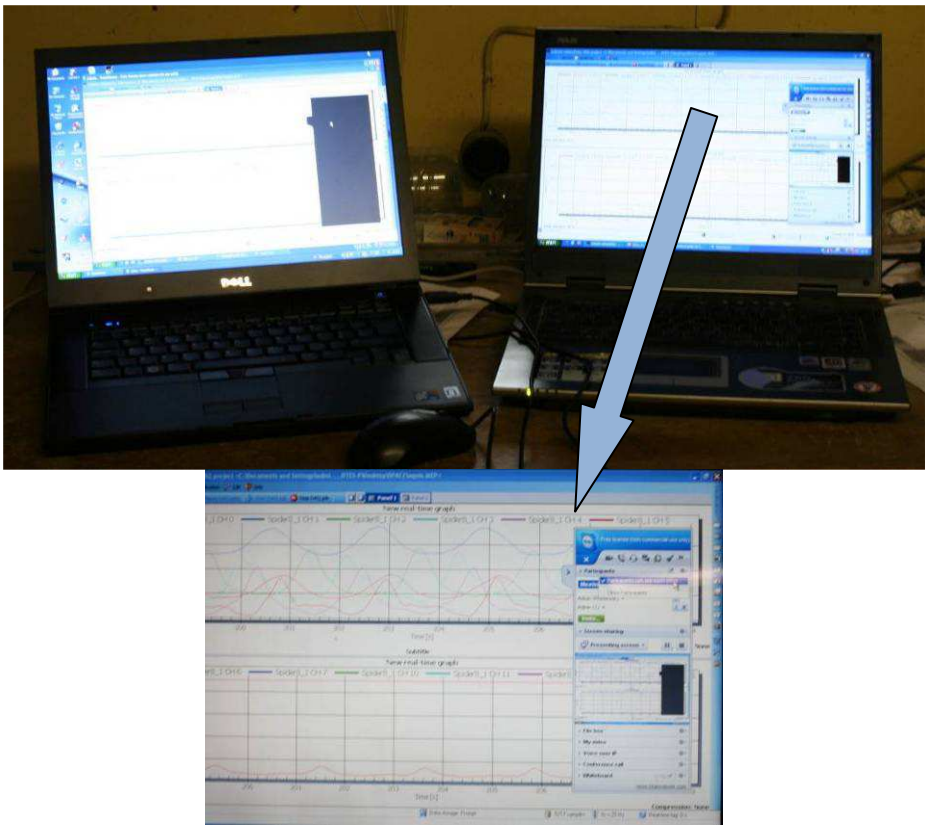


Figure 28 - Data acquisition. Meeting participants (left) visualizing the host desktop (right)

7. **Two-way communication between participants.** If allowed by the meeting host, communication between participants, either isolated or in group, is possible and is highly recommended in order to have a better experience of data sharing. This includes real-time chatting, VOIP conversation, video sharing and file sharing. (Figure 29).

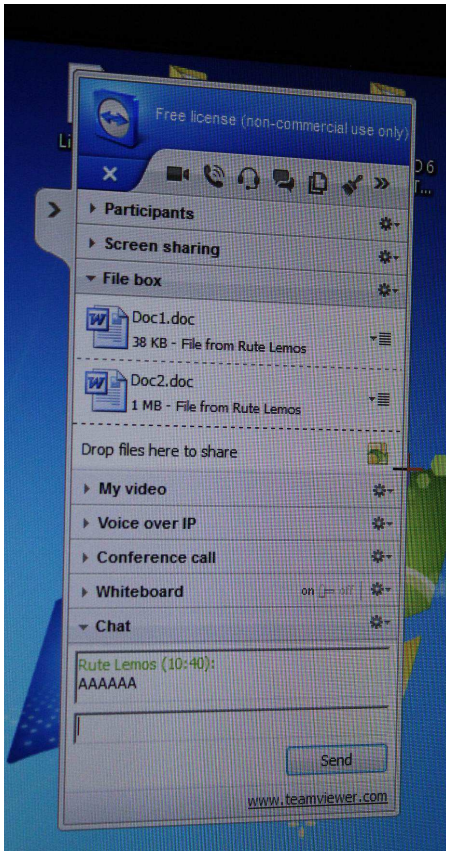


Figure 29 - Testing chat communication between participants.

8. **Saving and sharing data acquisition files**. After concluding the data acquisition, the saved file in the host computer was shared with the meeting participant, using the **Filebox** tool (Figure 30).

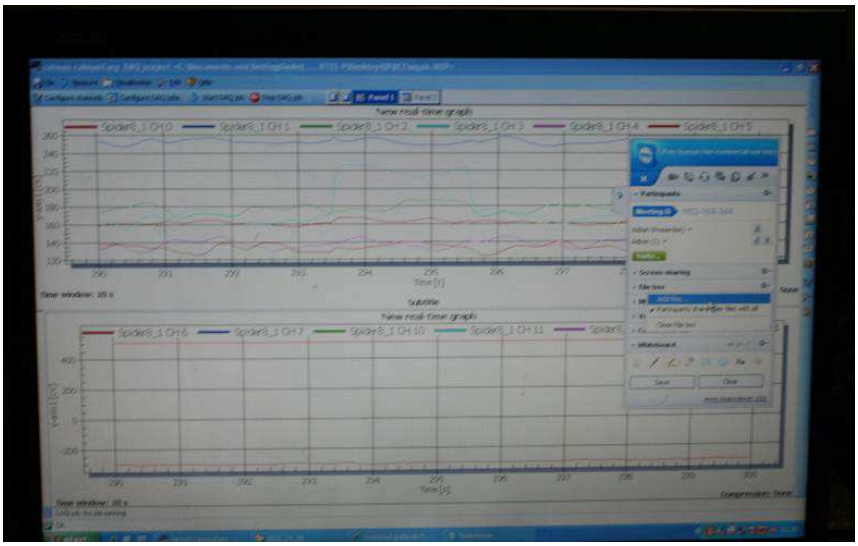


Figure 30- Host adding a file to the filebox

Promptly, all the meeting participants are able to download the shared files (Figure 31).

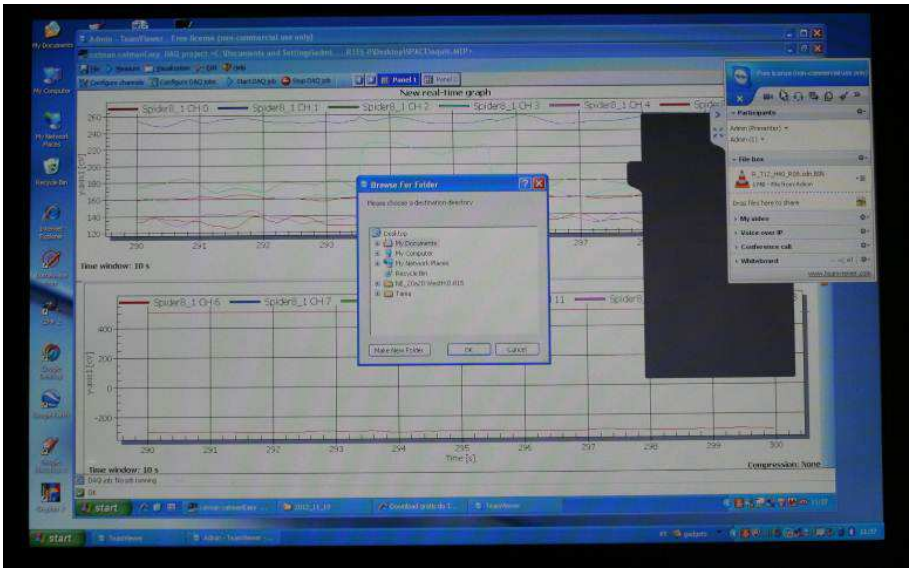


Figure 31 - Meeting participant downloading a file from the filebox

3.6 Remote Visualization of Data Acquisition and Video Decoding and Streaming at tank TOI2

This experience aimed to test the meeting feature for remote visualisation of data acquisition and at the same time to use video streaming to enable clients to access scale model tests.

Steps described at point 3.5.1 were also taken during this experience. Figure 32 shows some aspects of this data acquisition for two wave gauges.

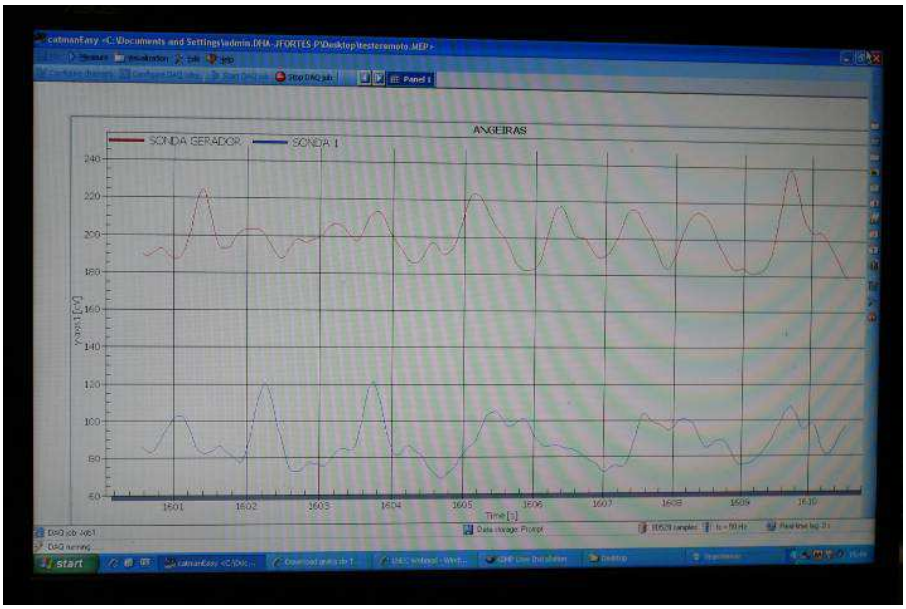


Figure 32 - Data acquisition for two wave gauges

Files resulting from those tests were provided to clients using the *filebox* feature and comments were made, using the *chat and voice over IP* features (Figure 33).

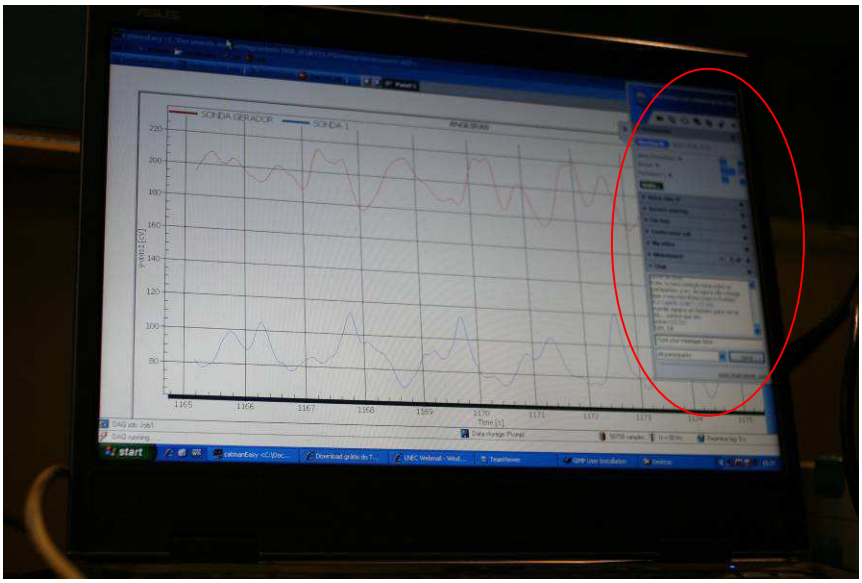


Figure 33 - Using *filebox*, *chat and voice over IP* features

Video streaming was achieved by connecting a digital SLR camera (Canon EOS 600 D) to a second laptop, using a Conceptronics A/D Convertor DAQ board (Figure 34).

Figure 34 - Cable connections between camera and computer.

Starting the free version of Microsoft's® Expression Encoder 4 software (http://www.microsoft.com/expression/products/EncoderPro_Overview.aspx) described previously in Capitão *et al.*, 2012, Fortes *et al.*, 2012 and Lemos *et al.*, 2012, will begin the video streaming at the *http://wms.fccn.pt/lnec_canal* server publishing point (Figure 35).

Figure 35 - Video streaming on Microsoft's® Expression Encoder 4 software

During this experience, several computers were used to test the quality of the video images and data remote visualisation, namely two institutions outside LNEC's network and three computers inside LNEC´s network by using Windows media player (WMP) through Internet Explorer (IE), in a PC system.

3.7 Results

In what concerns to remote access to data acquisition the main conclusions were:

- It revealed to be a simple task, using TeamViewer software, providing a good Image quality without any delay, as it uses a remote access technique.
- Network Bandwidth can influence the access quality, if several computers are connected at the same time.

For the video streaming experience, as in previous tests described in Capitão *et al.*, 2012, Fortes *et al.*, 2012 and Lemos *et al.*, 2012 it was showed:

- an adequate image quality of the video images;
- a delay varying from 30 to 60 s, depending on the user´s location, was detected.

Two different computers outside LNEC network were used. The main internet and computer characteristics of each of them are presented at Table 1.

Table 1 – Internet and computer characteristics

INSTITUTION	LOCATION	USER	COMPUTER CHARACTERISTICS	INTERNET CHARACTERISTICS
CONSULMAR	Lisbon, Portugal	José Lima and Paulo Agostinho	Windows 7 Pro and Windows XP SP3 Intel Core i7 CPU 870 @ 2.93Ghz RAM: 8 GB, 64 bit	Vodafone Fibra 200Mbits ZON Fibra 60 Mbits
IPTM	Lisbon, Portugal	Carlos Azevedo	Dell Optiplex Pentium Dual Core, 2048Mb Disk: 250Gb	100Base-T

4 CONCLUSIONS

This report describes the first set of experiences on remote access and data sharing, made at COI1 flume, for a 2D model, on the 22nd of November, and in the TOI2 wave tank, for a 3D model, on the 5th December 2012.

- In this experience, the free Teamviewer software package was used, which provided the capabilities of online meeting, presentation and team work. Other capabilities of this system, such as remote maintenance and access to unattended computers and home office, were not used in this work;
- By holding meetings with up to 25 participants, these online meetings avoid time and travel costs and make it possible to visualize experimental tests remotely;
- The used software allows browser based meetings. Participants do not need to install software to take part in presentations. All it takes to view the host desktop is a web browser and an internet connection. It also optimizes the quality and speed of the display based on your network connection, providing the best possible performance from DSL to mobile connections;
- For the video streaming experience showed an adequate image quality of the video images and a delay varying from 30 to 60 s, depending on the user´s internet and computer characteristics.

LABORATÓRIO NACIONAL
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Annex I

Comments from the participants

Boa tarde.

O teste correu bem, tendo utilizado duas ligações ao exterior diferentes (Vodafone Fibra 200Mbits e ZON Fibra 60 Mbits).
Foram utilizadas máquinas com Windows 7 Pro e Windows XP SP3 e dois browsers diferentes (IE9 e Firefox v17).

Melhores cumprimentos,

Paulo Agostinho e José Lima.

Estimada , Eng.ª Juana Fortes

Bom dia

Peço desculpa por só hoje estar a responder a este seu 'mail' que passo a concretizar:

- Computador utilizado: Desktop: Dell Optiplex Pentium Dual Core
  Memoria : 2048Mb
  Disco: 250Gb
- Características da rede: 100Base-T
- Qualidade da imagem: boa, sem grão e com velocidade real.

Segundo informação da nossa informática, a demora no acesso às imagens, tem a ver com problemas de largura de banda face à solicitação de 4 postos de trabalho a tentarem a aceder às mesma.

No que se refere ao acesso ao Teamviewer, o impedimento resultou de restrição de direitos no antivírus (McAffe) que não foi possível ultrapassar dado o curto espaço de tempo que mediou entre o conhecimento do modo de acesso, o diagnóstico do problema e a sua resolução.

Para algo mais disponha.

Saudações

Carlos Azevedo