



Mise à disposition des résultats

Shahrokh GHAVAMIAN



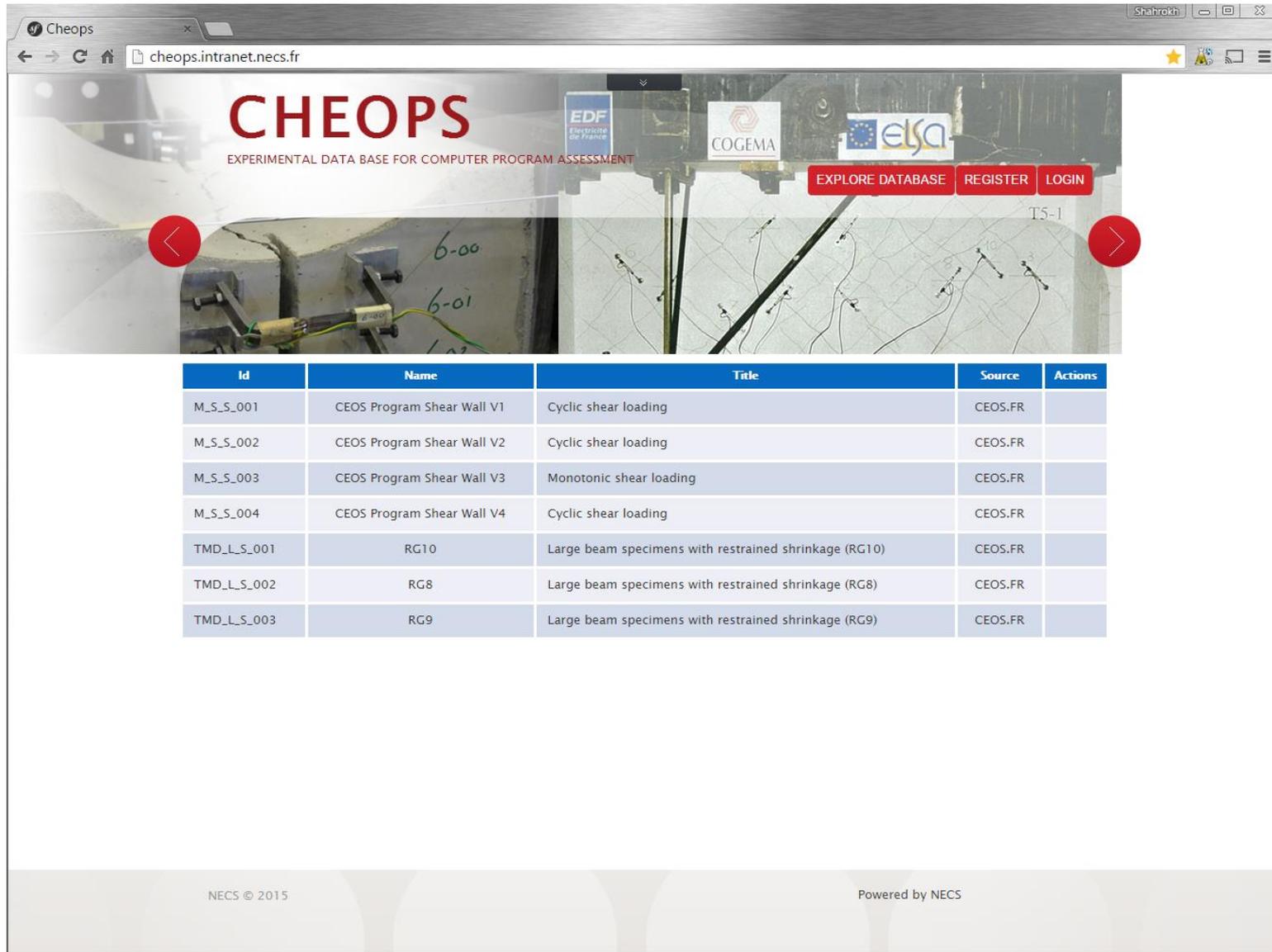
Ministère
de l'Écologie,
du Développement
durable
et de l'Énergie

04/06/2015



► Site web CHEOPS

- Données expérimentales accessible au : <https://cheops.necs.fr/>
- Inscrivez vous et recevez un identifiant + pass
- Accès libre aux fiches CEOS.FR
- Informations disponibles :
 - Résumé
 - Géométrie (plans de coffrage, ferrailage)
 - Propriétés matériaux (essais, tableaux de valeurs)
 - Dispositif expérimental (bâti, appuis, environnement, photos)
 - Mesures (descriptions, schémas, fichiers numériques, commentaires et analyses)



CHEOPS
EXPERIMENTAL DATA BASE FOR COMPUTER PROGRAM ASSESSMENT

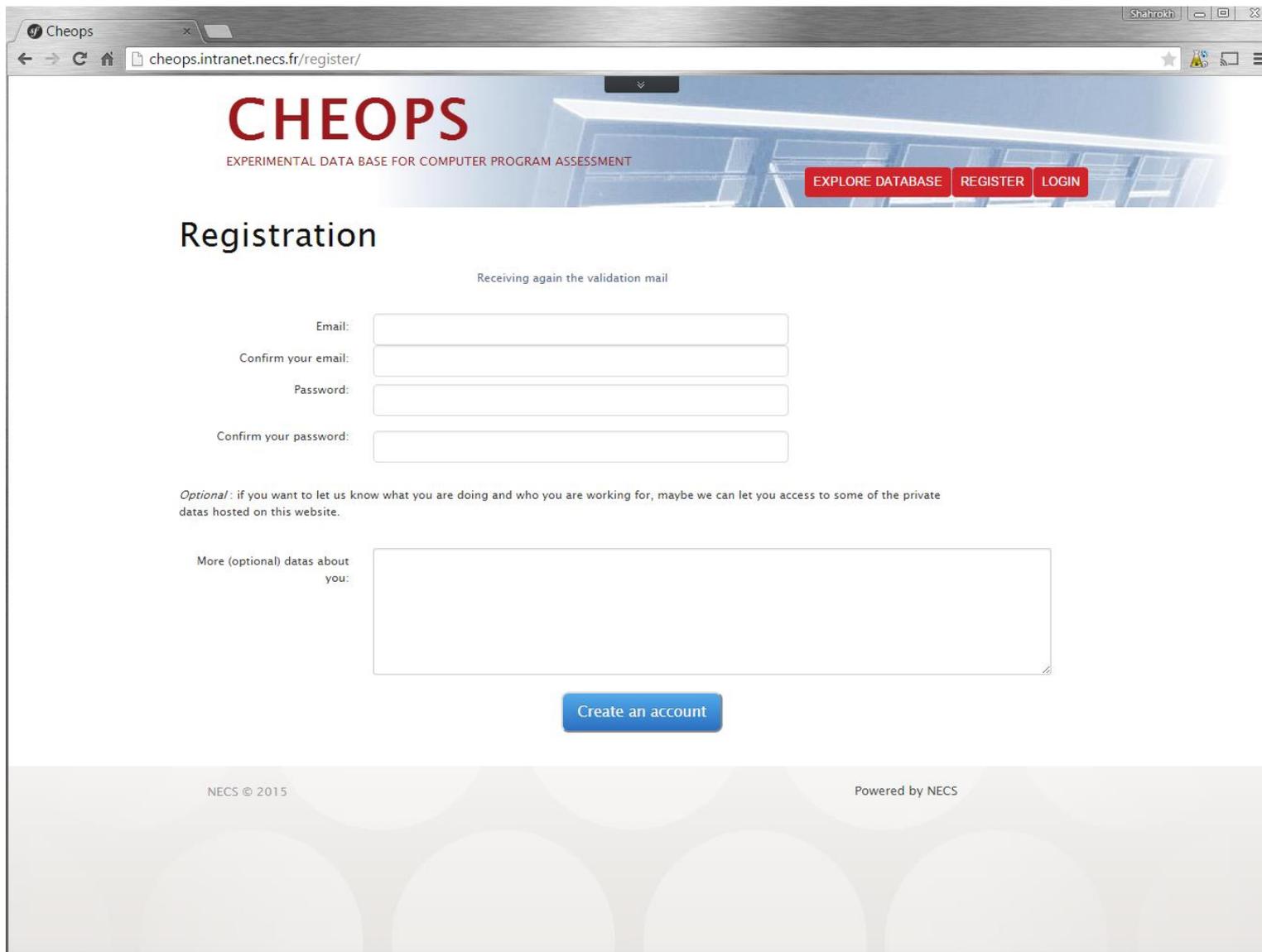
EDF Electricité de France | COGEMA | ELSA

EXPLORE DATABASE REGISTER LOGIN

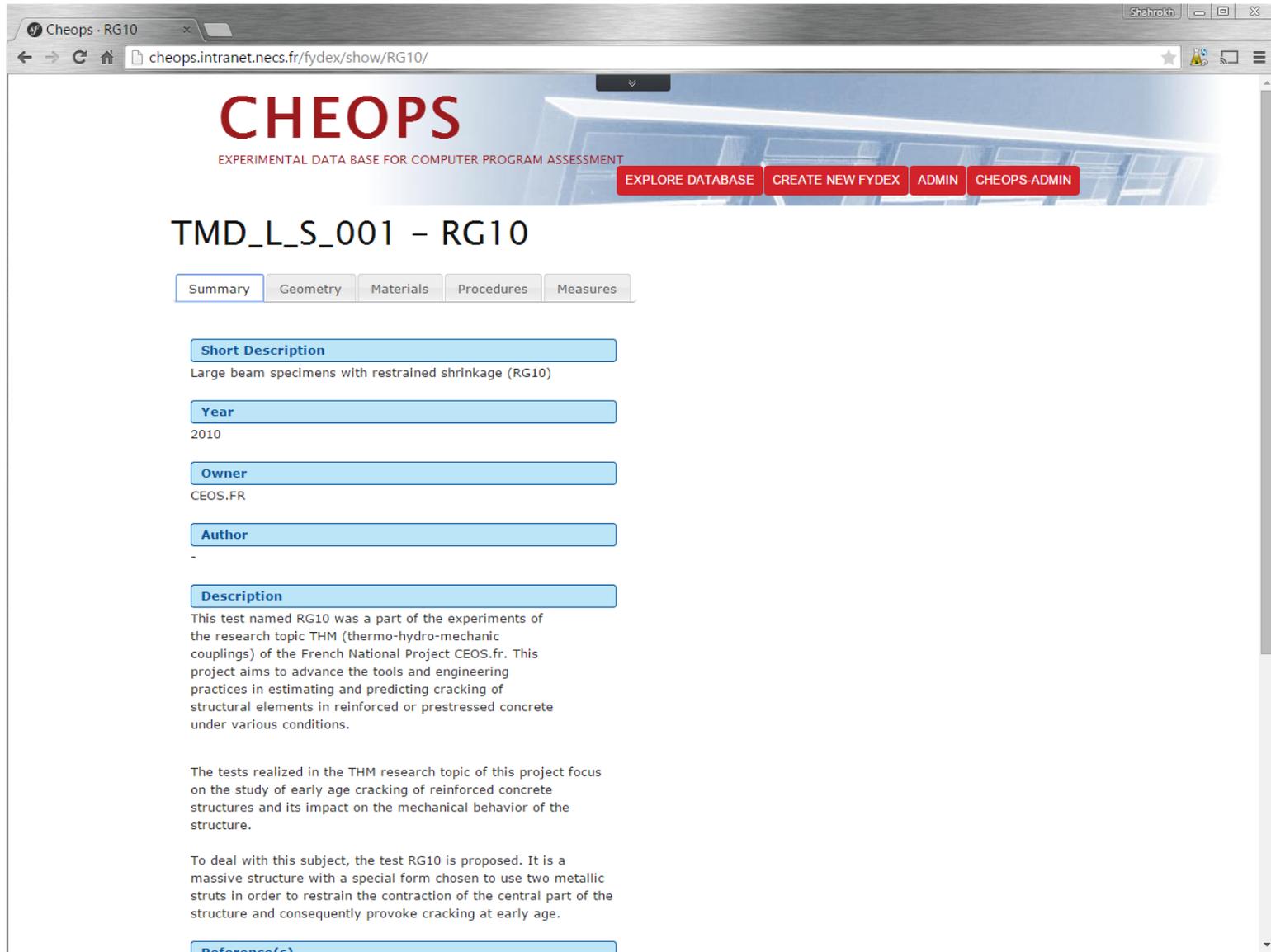
T5-1

Id	Name	Title	Source	Actions
M_S_S_001	CEOS Program Shear Wall V1	Cyclic shear loading	CEOS.FR	
M_S_S_002	CEOS Program Shear Wall V2	Cyclic shear loading	CEOS.FR	
M_S_S_003	CEOS Program Shear Wall V3	Monotonic shear loading	CEOS.FR	
M_S_S_004	CEOS Program Shear Wall V4	Cyclic shear loading	CEOS.FR	
TMD_L_S_001	RG10	Large beam specimens with restrained shrinkage (RG10)	CEOS.FR	
TMD_L_S_002	RG8	Large beam specimens with restrained shrinkage (RG8)	CEOS.FR	
TMD_L_S_003	RG9	Large beam specimens with restrained shrinkage (RG9)	CEOS.FR	

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The screenshot shows a web browser window with the URL `cheops.intranet.necs.fr/register/`. The page features a header with the **CHEOPS** logo and the subtitle "EXPERIMENTAL DATA BASE FOR COMPUTER PROGRAM ASSESSMENT". Navigation buttons for "EXPLORE DATABASE", "REGISTER", and "LOGIN" are visible. The main content area is titled "Registration" and includes a sub-header "Receiving again the validation mail". The registration form consists of four input fields: "Email:", "Confirm your email:", "Password:", and "Confirm your password:". Below the form, there is an optional section for providing more information, with the text: "Optional: if you want to let us know what you are doing and who you are working for, maybe we can let you access to some of the private datas hosted on this website." and a text area labeled "More (optional) datas about you:". A blue "Create an account" button is positioned at the bottom of the form. The footer contains the text "NECS © 2015" and "Powered by NECS".



The screenshot shows a web browser window with the URL `cheops.intranet.necs.fr/fydex/show/RG10/`. The page header features the **CHEOPS** logo and the tagline "EXPERIMENTAL DATA BASE FOR COMPUTER PROGRAM ASSESSMENT". Navigation buttons include "EXPLORE DATABASE", "CREATE NEW FYDEX", "ADMIN", and "CHEOPS-ADMIN".

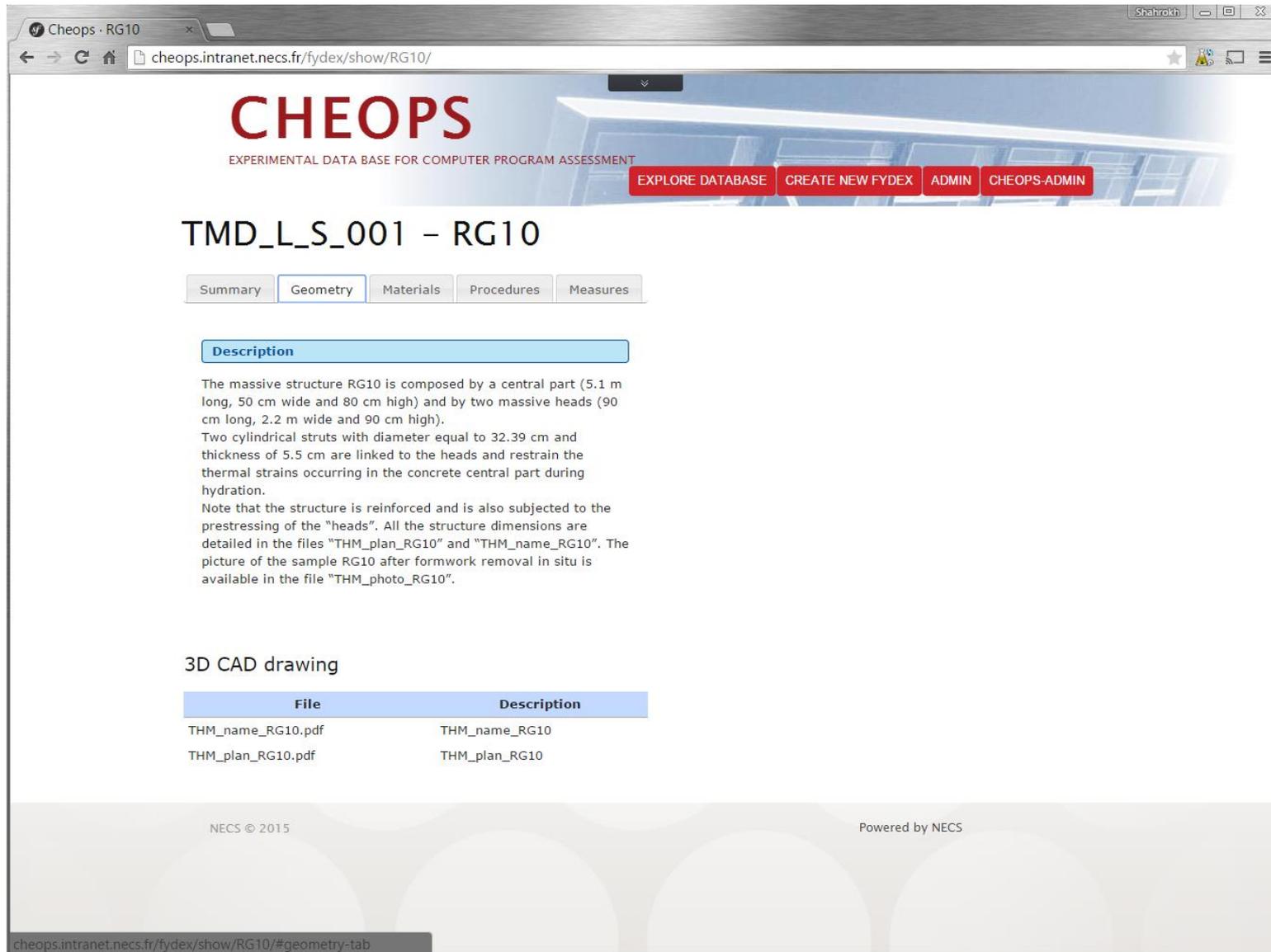
The main content area displays the test identifier **TMD_L_S_001 - RG10**. Below this, there are tabs for "Summary", "Geometry", "Materials", "Procedures", and "Measures". The "Summary" tab is active, showing the following details:

- Short Description:** Large beam specimens with restrained shrinkage (RG10)
- Year:** 2010
- Owner:** CEOS.FR
- Author:** -
- Description:**

This test named RG10 was a part of the experiments of the research topic THM (thermo-hydro-mechanic couplings) of the French National Project CEOS.fr. This project aims to advance the tools and engineering practices in estimating and predicting cracking of structural elements in reinforced or prestressed concrete under various conditions.

The tests realized in the THM research topic of this project focus on the study of early age cracking of reinforced concrete structures and its impact on the mechanical behavior of the structure.

To deal with this subject, the test RG10 is proposed. It is a massive structure with a special form chosen to use two metallic struts in order to restrain the contraction of the central part of the structure and consequently provoke cracking at early age.
- Reference(s):** -



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EXPLORE DATABASE CREATE NEW FYDEX ADMIN CHEOPS-ADMIN

TMD_L_S_001 – RG10

Summary **Geometry** Materials Procedures Measures

Description

The massive structure RG10 is composed by a central part (5.1 m long, 50 cm wide and 80 cm high) and by two massive heads (90 cm long, 2.2 m wide and 90 cm high). Two cylindrical struts with diameter equal to 32.39 cm and thickness of 5.5 cm are linked to the heads and restrain the thermal strains occurring in the concrete central part during hydration.

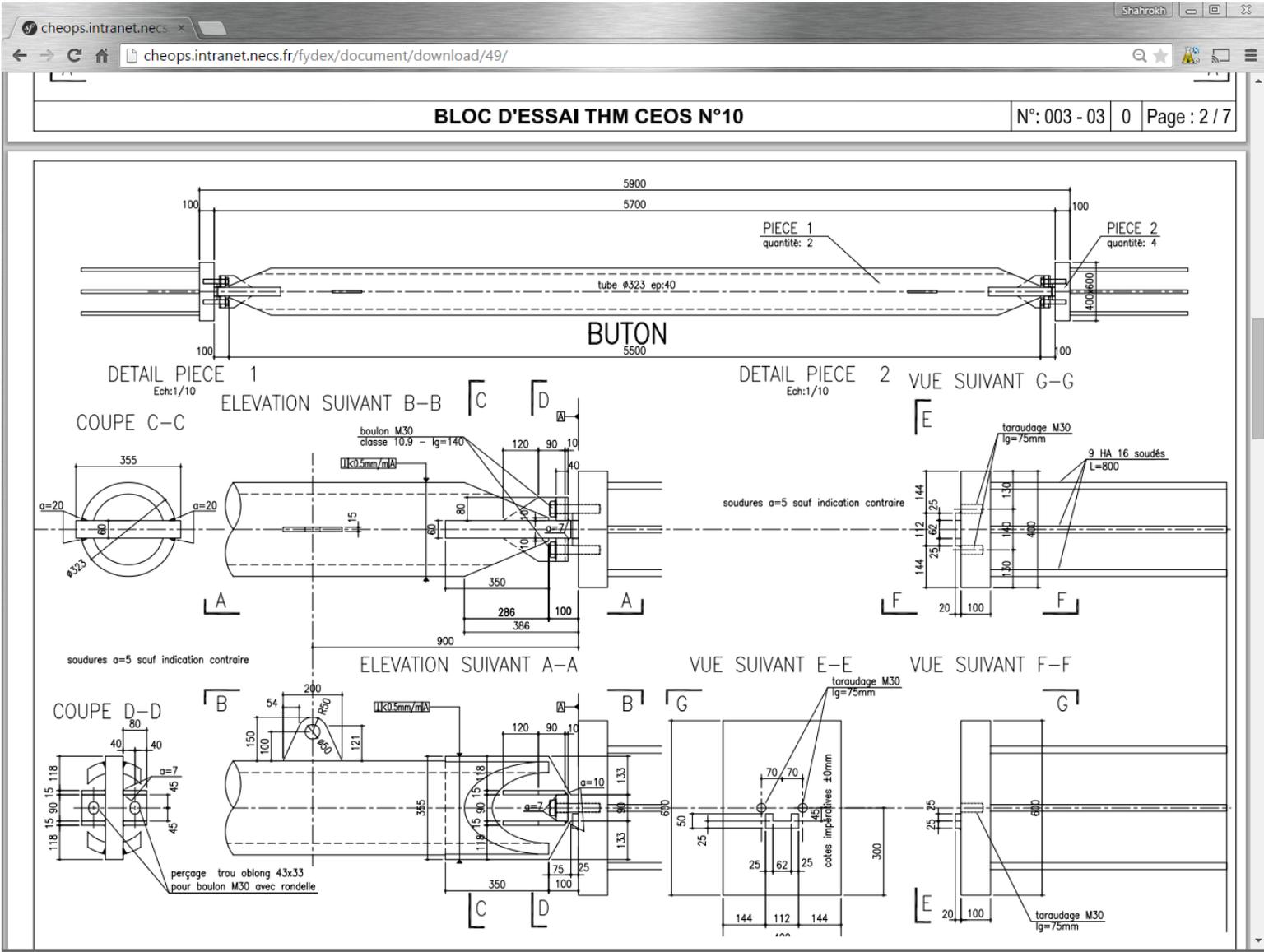
Note that the structure is reinforced and is also subjected to the prestressing of the "heads". All the structure dimensions are detailed in the files "THM_plan_RG10" and "THM_name_RG10". The picture of the sample RG10 after formwork removal in situ is available in the file "THM_photo_RG10".

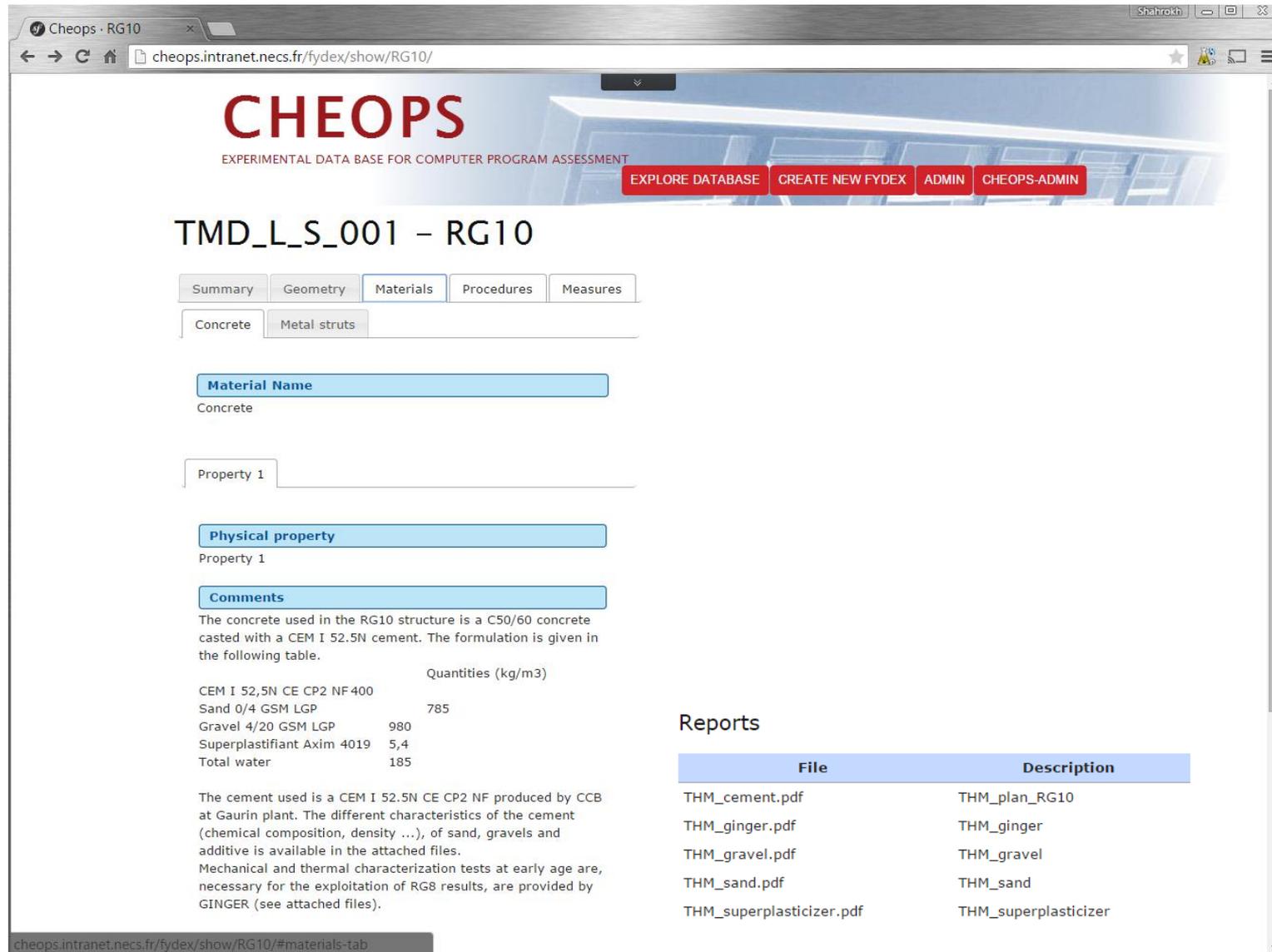
3D CAD drawing

File	Description
THM_name_RG10.pdf	THM_name_RG10
THM_plan_RG10.pdf	THM_plan_RG10

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cheops.intranet.necs.fr/fydex/show/RG10/#geometry-tab





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TMD_L_S_001 - RG10

Summary Geometry **Materials** Procedures Measures

Concrete Metal struts

Material Name
Concrete

Property 1

Physical property
Property 1

Comments
The concrete used in the RG10 structure is a C50/60 concrete casted with a CEM I 52.5N cement. The formulation is given in the following table.

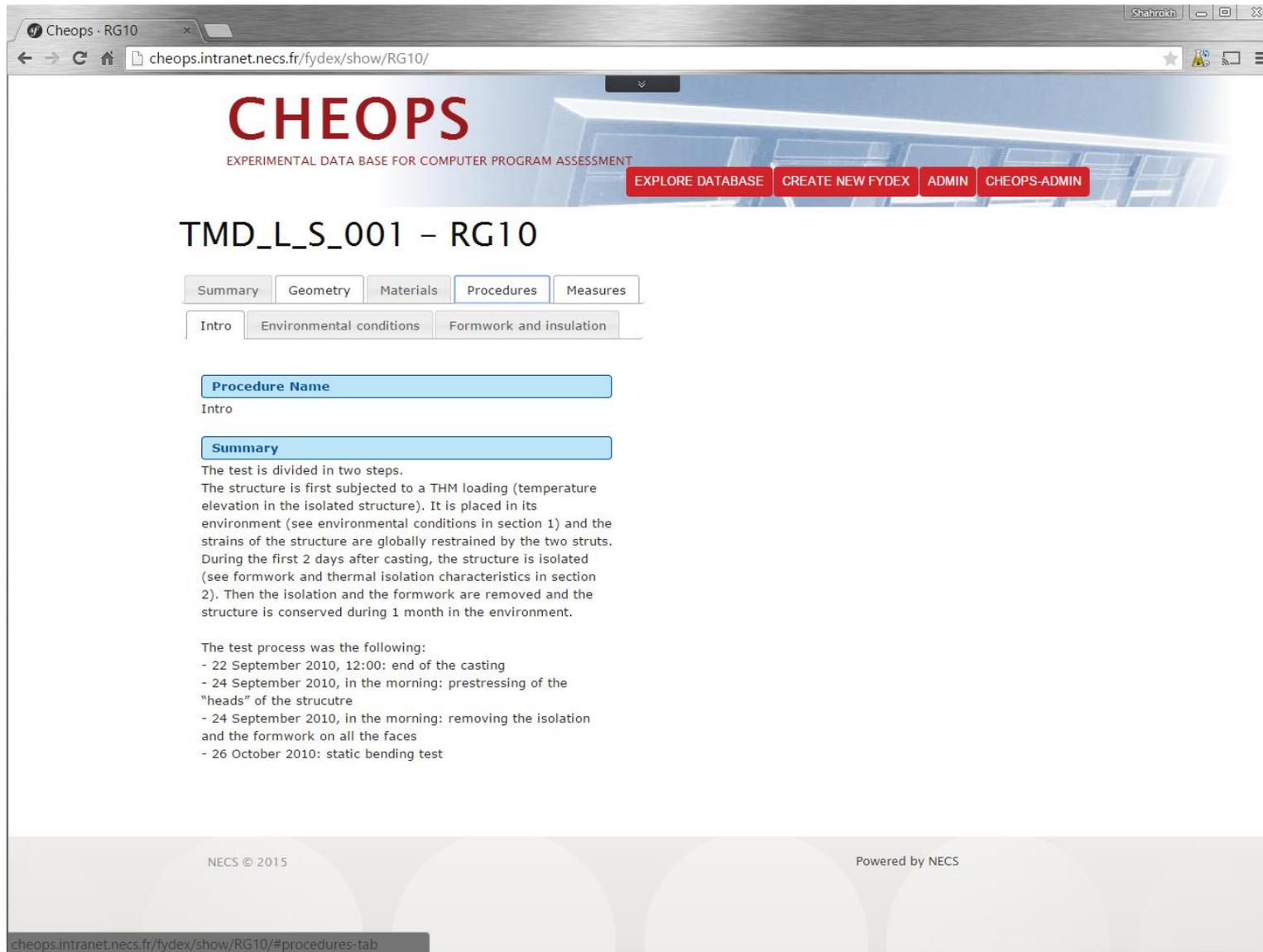
	Quantities (kg/m3)
CEM I 52,5N CE CP2 NF400	
Sand 0/4 GSM LGP	785
Gravel 4/20 GSM LGP	980
Superplastifiant Axim 4019	5,4
Total water	185

The cement used is a CEM I 52.5N CE CP2 NF produced by CCB at Gaurin plant. The different characteristics of the cement (chemical composition, density ...), of sand, gravels and additive is available in the attached files. Mechanical and thermal characterization tests at early age are, necessary for the exploitation of RG8 results, are provided by GINGER (see attached files).

Reports

File	Description
THM_cement.pdf	THM_plan_RG10
THM_ginger.pdf	THM_ginger
THM_gravel.pdf	THM_gravel
THM_sand.pdf	THM_sand
THM_superplasticizer.pdf	THM_superplasticizer

cheops.intranet.necs.fr/fydex/show/RG10/#materials-tab



The screenshot shows a web browser window with the URL `cheops.intranet.necs.fr/fydex/show/RG10/`. The page header features the 'CHEOPS' logo and the subtitle 'EXPERIMENTAL DATA BASE FOR COMPUTER PROGRAM ASSESSMENT'. Navigation buttons include 'EXPLORE DATABASE', 'CREATE NEW FYDEX', 'ADMIN', and 'CHEOPS-ADMIN'. The main content area is titled 'TMD_L_S_001 - RG10' and contains a tabbed interface with 'Procedures' selected. Under the 'Procedures' tab, there are sub-tabs for 'Intro', 'Environmental conditions', and 'Formwork and insulation'. The 'Procedure Name' field is highlighted in blue. The 'Intro' section is active, displaying the following text:

Procedure Name

Intro

Summary

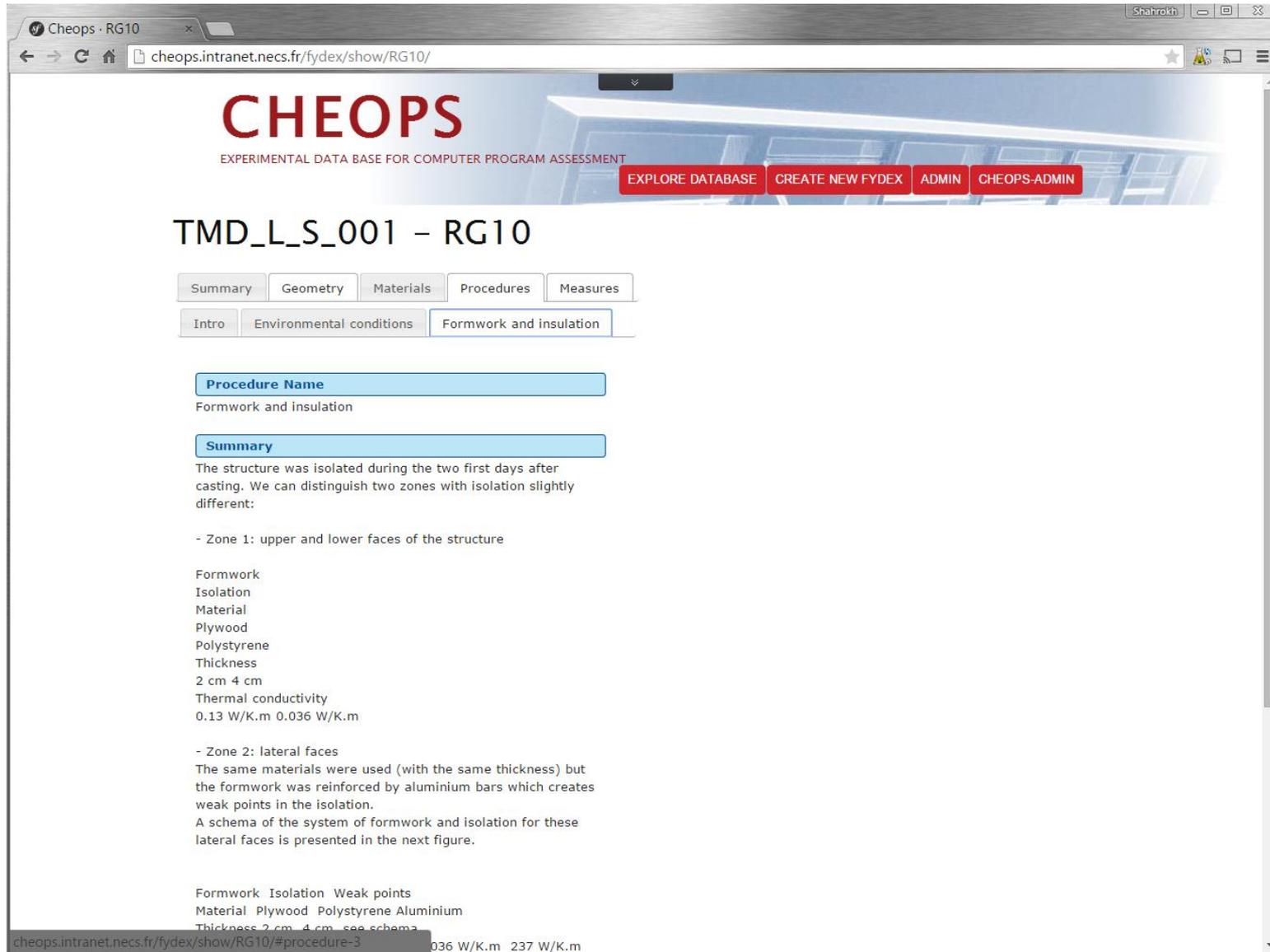
The test is divided in two steps.
 The structure is first subjected to a THM loading (temperature elevation in the isolated structure). It is placed in its environment (see environmental conditions in section 1) and the strains of the structure are globally restrained by the two struts. During the first 2 days after casting, the structure is isolated (see formwork and thermal isolation characteristics in section 2). Then the isolation and the formwork are removed and the structure is conserved during 1 month in the environment.

The test process was the following:

- 22 September 2010, 12:00: end of the casting
- 24 September 2010, in the morning: prestressing of the "heads" of the structure
- 24 September 2010, in the morning: removing the isolation and the formwork on all the faces
- 26 October 2010: static bending test

At the bottom of the page, it says 'NECS © 2015' and 'Powered by NECS'. The browser's address bar shows the URL `cheops.intranet.necs.fr/fydex/show/RG10/#procedures-tab`.





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TMD_L_S_001 – RG10

Summary Geometry Materials Procedures Measures

Intro Environmental conditions **Formwork and insulation**

Procedure Name
Formwork and insulation

Summary
The structure was isolated during the two first days after casting. We can distinguish two zones with isolation slightly different:

- Zone 1: upper and lower faces of the structure

Formwork
Isolation
Material
Plywood
Polystyrene
Thickness
2 cm 4 cm
Thermal conductivity
0.13 W/K.m 0.036 W/K.m

- Zone 2: lateral faces
The same materials were used (with the same thickness) but the formwork was reinforced by aluminium bars which creates weak points in the isolation.
A schema of the system of formwork and isolation for these lateral faces is presented in the next figure.

Formwork Isolation Weak points
Material Plywood Polystyrene Aluminium
Thickness 2 cm 4 cm see schema

0.036 W/K.m 0.237 W/K.m



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TMD_L_S_001 – RG10

Summary Geometry Materials Procedures Measures

Intro Measurements Analysis

Measure name

Measurements

Summary

The position of the different sensors used is available in the attached file "THM_instrumentation_RG10". The processed measurements obtained can be found in the file "THM_data_RG10".

Reports

File	Description
THM_instrumentation_RG10.pdf	THM_instrumentation

Others

File	Description
THM_data_RG10.xls	THM_Data_RG10

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cheops.intranet.necs.fr/fydex/show/RG10/#measure-2



cheops.intranet.necs.fr/fydex/document/download/50/
Shahrokh

PLANS D'INSTRUMENTATION P. 27
Réf : R 11 PA 635 Indice 0 = 20/04/11 © SITES



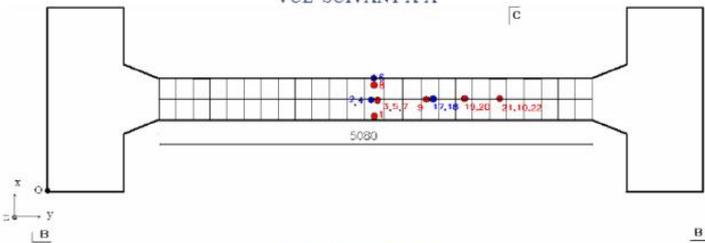
Projet National CEOS.fr – Axe 2 - Expérimentation – Bloc n°10 Retrait Gêne



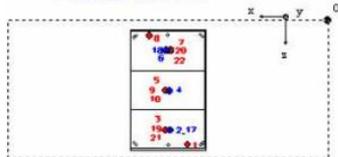
Plans d'implantation des capteurs RINCENT-BTP dans le CE RG10

Implantation des capteurs à corde vibrante noyés dans le bloc RG10

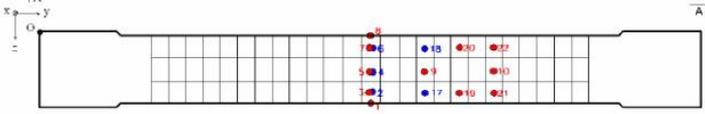
VUE SUIVANT A-A



VUE SUIVANT C-C



VUE SUIVANT B-B



● Capteur à corde vibrante disposé suivant Y (longitudinal)
 ● Capteur à corde vibrante disposé suivant X (horizontal)

PLANS D'INSTRUMENTATION
P. 37

Réf : R 11 PA 635 Indice 0 = 20/04/11
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6e53a725be2effab1200df1aa1b04036a2844160.xls [Mode de compatibilité] - Microsoft Excel

A1	Date et heure UTC														
1	Date et heure UTC	CVtemp(1)	CVtemp(2)	CVtemp(3)	CVtemp(4)	CVtemp(5)	CVtemp(6)	CVtemp(7)	CVtemp(8)	CVtemp(9)	CVtemp(11)	CVtemp(12)	CVtemp(13)	CVtemp(14)	CVtemp(15)
2	[]	[°C]	[°C]	[°C]	[°C]	[°C]									
3	22/09/2010 08:00:00	11.86	12.34	12.5	13.93	13.92	15.08	15.05	15.88	13.82	14.38	22.22	18.58	28.7	
4	22/09/2010 08:10:00	12.05	12.61	12.95	14.52	14.48	15.83	15.72	16.66	14.49	14.49	22.26	18.54	28.59	
5	22/09/2010 08:20:00	12.58	13.17	13.47	15.46	15.45	16.95	16.73	17.71	15.24	14.64	22.33	18.65	28.71	
6	22/09/2010 08:30:00	12.98	13.76	13.92	16.17	16.16	18.03	17.81	19.95	15.98	14.71	22.33	18.58	28.67	
7	22/09/2010 08:40:00	13.84	14.55	14.92	17.28	17.2	18.89	18.67	22.6	17.18	14.97	22.37	18.73	28.52	
8	22/09/2010 08:50:00	14.55	15.33	15.71	17.88	17.95	19.33	19.19	21.63	17.66	15.23	22.48	18.65	28.4	
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10	22/09/2010 09:10:00	16.23	17.12	17.42	19.89	19.89	25.45	24.68	23.49	19.67	15.76	22.52	18.8	28.07	
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12	22/09/2010 09:30:00	17.68	18.5	18.92	21.76	21.57	29.18	27.51	25.8	21.28	16.61	22.74	18.84	27.88	
13	22/09/2010 09:40:00	18.24	19.13	19.51	22.43	22.24	30.27	28.52	29.13	21.88	16.95	22.82	18.95	27.88	
14	22/09/2010 09:50:00	19.29	20.29	20.63	23.4	23.1	30.79	29.04	30.32	22.88	16.99	22.96	18.99	27.73	
15	22/09/2010 10:00:00	24.28	24.13	24.55	24.78	24.89	31.87	30.28	28.79	24.79	17.21	23.04	19.13	27.66	
16	22/09/2010 10:10:00	24.06	24.28	24.7	24.89	24.92	32.95	30.31	28.9	24.94	17.4	23.19	19.21	27.58	
17	22/09/2010 10:20:00	23.99	24.32	24.66	24.97	25	29.15	26.43	28.57	25.01	17.96	23.34	19.28	27.47	
18	22/09/2010 10:30:00	24.1	24.43	24.7	25.08	25.22	29.93	27.59	30.55	25.2	18.4	23.49	19.32	27.36	
19	22/09/2010 10:40:00	24.06	24.35	24.74	25.08	25.22	26.31	26.21	25.81	25.12	18.25	23.52	19.55	27.43	
20	22/09/2010 10:50:00	24.1	24.43	24.7	25.23	25.3	26.16	26.06	26.25	25.23	18.63	23.71	19.66	27.32	
21	22/09/2010 11:00:00	24.14	24.35	24.7	25.27	25.45	26.23	26.1	26.48	25.38	18.63	23.86	19.73	27.43	
22	22/09/2010 11:10:00	24.14	24.5	24.77	25.42	25.45	26.27	26.1	26.59	25.38	19.07	24.01	19.92	27.28	
23	22/09/2010 11:20:00	24.14	24.5	24.7	25.49	25.52	26.31	26.17	26.85	25.46	19.45	24.16	19.96	27.28	
24	22/09/2010 11:30:00	24.14	24.47	24.77	25.57	25.56	26.38	26.17	27.07	25.53	19.52	24.38	20.14	27.43	
25	22/09/2010 11:40:00	24.28	24.54	24.77	25.57	25.6	26.5	26.32	27.22	25.61	19.3	24.68	20.25	27.43	
26	22/09/2010 11:50:00	24.28	24.54	24.85	25.68	25.71	26.61	26.39	27.3	25.64	18.1	24.83	20.4	27.43	
27	22/09/2010 12:00:00	24.17	24.58	24.85	25.64	25.82	26.65	26.62	27.34	25.68	17.47	24.75	20.48	27.51	
28	22/09/2010 12:10:00	24.29	24.54	24.88	25.75	25.82	26.76	26.62	27.52	25.79	17.36	24.87	20.55	27.43	
29	22/09/2010 12:20:00	24.29	24.61	24.88	25.83	25.93	26.87	26.69	27.6	25.83	18.66	24.83	20.48	27.58	
30	22/09/2010 12:30:00	24.47	24.58	24.96	25.94	25.89	26.91	26.84	27.67	25.79	18.89	24.9	20.55	27.77	
31	22/09/2010 12:40:00	24.43	24.69	25	25.98	25.97	27.06	26.92	27.75	25.98	18.85	24.98	20.55	27.73	
32	22/09/2010 12:50:00	24.47	24.76	25	25.94	26.04	27.2	26.92	27.82	26.05	19.37	25.13	20.7	27.81	
33	22/09/2010 13:00:00	24.51	24.73	25.03	26.05	26.04	27.21	27.03	27.9	25.98	19.49	25.28	20.78	27.81	
34	22/09/2010 13:10:00	24.55	24.73	25.03	26.16	26.16	27.35	27.07	28.01	26.09	19.6	25.28	20.96	27.84	
35	22/09/2010 13:20:00	24.66	24.8	25.11	26.09	26.27	27.35	27.25	28.01	26.09	19.89	25.43	20.96	27.73	
36	22/09/2010 13:30:00	24.66	24.91	25.07	26.2	26.19	27.43	27.36	28.04	26.17	19.82	25.65	21.3	27.81	
37	22/09/2010 13:40:00	24.7	24.88	25.11	26.28	26.3	27.5	27.25	28.12	26.24	20.04	25.87	21.37	27.88	

Données Bloc RG10



The screenshot shows a web browser window with the URL `cheops.intranet.necs.fr/fydex/show/RG10/`. The page header features the **CHEOPS** logo and the tagline "EXPERIMENTAL DATA BASE FOR COMPUTER PROGRAM ASSESSMENT". Navigation buttons include "EXPLORE DATABASE", "CREATE NEW FYDEX", "ADMIN", and "CHEOPS-ADMIN".

The main content area is titled "TMD_L_S_001 - RG10" and contains a tabbed interface with the following tabs: Summary, Geometry, Materials, Procedures, Measures, Intro, Measurements, and Analysis. The "Analysis" tab is currently selected.

Under the "Analysis" tab, there are two sections:

- Measure name:** Analysis
- Summary:** The analysis of the measurements realized during the test RG10 is proposed in the attached file THM_analysis_RG10.

Below the summary, there is a "Reports" section with a table listing available files:

File	Description
Rapport_ceos_experimentation_THM_11092012.pdf	THM_analysis

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Laboratoire Matériaux et
Durabilité des Constructions

CEOS.FR
Projet National de R&D

Dépouillement des résultats expérimentaux des
structures RG du projet CEOS

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Approbation
Jean Michel TORRENTI (IFSTTAR Paris)

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- N'hésitez pas à contribuer de nouvelles fiches



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