



*TWENTIETH  
INTERNATIONAL  
CONGRESS  
ON LARGE DAMS*

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*VINGTIÈME  
CONGRÈS  
INTERNATIONAL  
DES GRANDS BARRAGES*

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TWENTIETH  
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ON LARGE DAMS

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QUESTION 78

# **TRANSACTIONS**

# **COMPTES RENDUS**

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## NOTE

### Units of Measurement

As for the previous Congresses and though some authors do not fully agree, we attempt to follow the recommendations of the International System of Units (SI).

For example,  $\text{hm}^3$  and  $\text{km}^3$  were preferred to  $10^6$  and  $10^9$   $\text{m}^3$ , or million and billion cu.m. See Bulletin 34 "ICOLD Guide for the International System of Units (SI)", page 13.

The decimal sign may be the full stop (Anglo-Saxon usage) or the comma (European usage); but as a safeguard against confusion, full stop (period) and comma are used as decimal sign only.

Where the number of digits before or after the decimal sign exceeds three, the digit should be divided into groups of three by half space.

We meet not enough co-operation from some authors writing in English who go on keeping the comma to separate the groups of three digits instead of using half space. It was not possible to make the appropriate corrections in all the tables provided by the authors and even in the text. Sorry for the inconvenience.

## AVERTISSEMENT

### Unités de Mesure

Comme pour les Congrès précédents et bien que certains auteurs manifestent des réticences à ce sujet, on s'est efforcé de suivre les recommandations du Système International d'Unités (SI).

Par exemple, on a utilisé plus volontiers  $\text{hm}^3$  et  $\text{km}^3$  au lieu de  $10^6$   $\text{m}^3$  et  $10^9$   $\text{m}^3$  ou million et milliard de mètres cubes. Voir Bulletin 34 « Guide CIGB du Système International d'Unités (SI) », page 13.

De même, on a retenu le point (usage anglo-saxon) et la virgule (usage européen) comme signe décimal, mais pour éviter toute confusion, la virgule et le point ne sont utilisés que comme signe décimal.

Aussi, quand le nombre de chiffres avant ou après la virgule est supérieur à 3, les chiffres sont groupés par 3, chaque groupe étant séparé par un court espace.

À ce sujet nous rencontrons encore des difficultés de la part de quelques auteurs de langue anglaise qui continuent à utiliser la virgule au lieu d'un court espace pour séparer les groupes de trois chiffres. Nous n'avons pas pu apporter les corrections nécessaires dans tous les tableaux fournis par les auteurs et même dans le texte. On voudra bien nous en excuser.

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**PAPERS ON Q 78**

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**RAPPORTS SUR LA Q 78**

QUESTION

78

**Monitoring of dams and their foundations**

**Subject**

- a) Monitoring and data processing systems with particular reference to the performance of automated installations.
- b) Comparison of performance with predictions, back analysis.
- c) Optimisation of monitoring systems, reliability and uncertainties in operation.
- d) The relative importance of visual inspection compared with instrumentation.

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**Auscultation des barrages et de leurs fondations**

**Objet**

- a) Auscultation et systèmes de traitement des données, en particulier résultats relatifs aux dispositifs automatiques.
- b) Comparaison du comportement observé avec les prévisions, analyses en retour.
- c) Optimisation des systèmes d'auscultation, prise en compte de la fiabilité et des incertitudes lors de l'exploitation.
- d) Analyse de l'importance de l'inspection visuelle comparativement aux appareils de mesures.



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**FIBRE OPTIC TEMPERATURE MEASUREMENTS IN DAM MONITORING  
- FOUR YEARS OF EXPERIENCE <sup>(1)</sup>**

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1. INTRODUCTION

There are different objectives for the performance of temperature measurements in dams. In big concrete units for example, they enable conclusions about the development of the hydration temperature, and at the down stream side of sealing elements the localisation of possible leaks. The technology of distributed fibre optic temperature measurements offers now the possibility to measure the ambient temperature along fibre optical cables of a few kilometre length continuously with high accuracy. This technique posses compared to the conventional measuring method a much higher information density and improves therefore considerably the evaluation of the temperature distribution in big constructions.

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<sup>(1)</sup> *Utilisation de fibres optiques pour la mesure des températures dans l'auscultation des barrages – Quatre années d'expérience.*