Discussion

SUPPLEMENTARY SESSION

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September 1, 1978. Afternoon.

Chairman: KLEMENT (Austria)

KLEMENT - We listened to seven papers about "case histories" and first Mr Vos gave us a very interesting view on the building of such an artificial Island. I ask if there are any questions or discussions in this respect.
I think we must have thousands of questions, of course. I want to ask Mr Vos all the loadings which you had. In that way they were decided: you cannot design such a framework from nothing else, so you have to consider a lot of solutions. In what way was this reached ?

VOS - Well, this was not an easy job, but let us first say that the FIP, the Federal International Precontraint, has done some work on concrete structures and I must say that really there was a great work from my colleague from Europe Etudes. About how to cope and how to deal with, the main problem, in this case, was the loading of other construction stages and very important were tolerances too, together with creep and these heavily loaded discs. So, anybody who was thought expert in load case was really asked to work and control it.

DUTERTRE - I would just add one word about this structure. It was designed very conservatively, because it was the first one, and, about finite elements, we did not use them to design it, it was designed with the old stress analysis. But the way which had to be taken into account in the design took three more times , since the structure is on the sea.

KLEMENT - Is there another question or another discussion point to this ? Then, I will ask for the bridge designing programs and their comments or questions.

BLAUWENDRAAD - As regards to the paper concerning creep problems , I have a question. I think that the real problem arise when you design a bridge and take into account the effect of creep at the several stages; you have to adopt figures on the creep you do not know exactly. At least, I think that is the Dutch practice. At the time you predict the behaviour of the structure, the material which will be used is not known yet. What about the feedback in the bridges ? Is there any experience whether the measures may be true or not ?

HAAS - When we do the analysis, we consider the German standards. Unfortunately, there is very little feedback. A bridge was carefully analized but where you wanted to measure the deflections unfortunately the first measurement was made in a very improper way, so we are no longer able to compare the measurements and they are very important in this case, but we have just analyzing a third

bridge of this kind and this bridge will be very well measured.
In a couple of years, I think that we will have some data in order to check our analysis, but this is not a check of our program, because I think our program works well. It is in the range of the models which has done by the German prestressing guidelines. It is a check whether prestressing guidelines are in accordance with the structure or not.

KLEMENT - I have my own opinion on this subject. In the structures, creep and shrinkage are very important for the deformations and maybe for stresses, but not so much for the safety of the structure: actually, the shrinkage and the creeping are sometimes nearly twice as much.

FISKUM - I have followed two bridge measurements: the first 110 m. long continuous; for the second we have 7 years' measurements. In the Netherlands we have another bridge 140 m. long, which has some problems, but I think it is not due to a wrong calculation. It is rather due to other reasons, quite difficult to explain here.

UHERKOVICH - We made a lot of measurements, but we have found that it was not only a problem of the creep, but we have a very wide system of unknown factors and very influencing factors. For instance, we do not know exactly what the bridge weight is, because we do not know what the actual size of the bridge is. The measurements are very expensive and they do not always give satisfactory results. So we know that, for example, this creep calculation and these values are approximately and satisfactorily valid but we cannot take into account them only. This is the reason why our Laboratory is looking for a complete way of calculating bridges.

VOS - I would also like to comment on creep very rapidly.
I think of about 15 years ago - it was in 1965 - when computer came in into our structural engineering. I was in force in the design of a kind of disc-shaped exposition building in the Netherlands. There was a big structure and with a slab projecting from the central support, because we were able,in those days, to compute the flexions due to creep and temperature within 4 or 5 digits, we really did it. The most stupid error I ever made is giving this sheet to the client who, three days ago, asked me a new updated report to give a motivation of how the deflections were done. In my opinion, creep goes back to test from Russia at the beginning of the century, at the 20' or 30', and I think in bridges and so on. If there is a small difference in creep as you explained, this really is not so dangerous. Of course, when creep comes into stability problems, it really can be of a fairly big danger.

KLEMENT - Is there anything else to say about creep, bridges, or use of computer? Then, I must ask for questions on the impact of computer development on the art of concrete dam displacement control. I have a question on this remark. I would like to know of how many dams are you able to get displacement; moreover, what is your experience in earthquake measurements in Italy.

FANELLI - Well, for the control and check-up of static displacement, we have under control now, with this type of prediction, about 16 or 17 dams and 40 more concrete dams are scheduled to come into stream in the next few years. This is for existing dams - in service dams. Of course, our type of analysis could also be applied to design new dams, but in Italy there are now very few dams which have being designed. In fact, most of the available sites have already been exploited. This is for static displacement check-up. As for the dynamic behaviour, we are pursuing, together with ISMES, full series of in-situ tests to measure actual dynamic characteristics of dams, in order to be able to make a reliable seismic analysis of these dams. Besides this, ENEL, together with a National Authority for the research of new energy, has made up quite a wide national network of accelerographs. There are 170 of them and many of them are located near the dams, but to my knowledge only one or two are installed very close to dams. On some dams we have instruments able to record weak seismic events, but not strong ones. There are now studies to equip important dams with strong accelerographs placed on the dam itself.

KRUISMAN - Do you have any possibility to get the response of the dam for earthquakes with a seismographic network? Are you able to compare theoretical and real values?

FANELLI - Yes, I may mention in this connection an experience we had after one of the bigger seismic events in Friuli, in 1976. We could install a geophonic network on a dam which was very near to the epicenter, and which was also very near to one of those accelerographs. So we were able - on the after shock, not on the main shock - up to the 5th degree of the Richter Scale, to measure the actual response of the dam and compare it with the theoretical response. The results were extremely satisfactory, and in that case we could also make an evalutation of what the response of the dam would have been to the main shock if it had remained in the elastic range, which can be open to doubt, because in some areas maybe they did not remain in the elastic range, but only in very small restricted areas. So, we have a full set of studies on this topic of the behaviour of dams and if you are interested, I can send you some material on this topic.

KLEMENT - Other questions on this as we are at the very end of our meeting? Are there questions on other important things we had this last day ?

KRUISMAN - I think the organizators of this colloquium have heard a lot of opinions about interface, about computing, about structural engineering, and what is the result of it ? I mean, what are you going to do with it? Are you going to make any suggestions for improvement of this interface ? Because, say, all those papers have been prepared loose from each other; we have now seen and heard them all, and they could not be compared before but now they have to be.

KLEMENT - I think that you will be able, as President of our task group, to give an answer to that.

FANELLI - Naturally, this is the question which poses itself. I am grate ful to Dr. Kruisman for posing it from the floor. I am trying now to reply. The task which was set to our task group was to try to formulate clearly the problems and we proposed to IABSE to hold such a colloquium as the present one as a first stage in order to formulate clearer questions for the 1980 IABSE Congress in the hope that in a better occasion, the question of interface between design and computing could be met in a more systematic way and, if possible, with some answers to the more pressing questions. So, what are we going to do now with the results of this colloquium is to try and formulate clearly the main theme and some sub-themes for the spe cial session of 1980 IABSE Congress. This will be announced in due time and, of course, all the participants in this colloquium and also all interest ed people are invited to submit papers, so that we can reach some definite conclusions after the Vienna Congress. Thi is a partial response, a partial answer to your question, and on the role, I think, that the mission of the first stage of the task group has been accomplished in the sense that we have heard many ideas and many questions and remarks but there seems to be, on the whole, a general consensus about what are the more pressing questions in this business. I know that now, in this moment, at the end of three days sessions, with all the fatigue of these sessions behind us and without having had the time to digest all the information that has been given, it would be quite foolish to try to sum up the discussions and the papers but general remarks maybe can be made. For instance, it seems to me that everybody agrees that computers are to stay with us; there is no return back to a world without computers. However, there is a widely felt uneasiness that the computers, these powerful tools which are offered to us, can often be misused or there are dangers of misuse, either due to a wrong choice of tools in relation to objectives, wrong expectations, wrong or no appreciation of consequences, even addition to computers, inability to c heck results inde- pendently, failure in c ommunication, duplication of efforts and so on. Besides that, everybody seems to agree, or at least, if not everybody, the large majority seems to agree that the computers or, to define better the things, hadware and software, are only tools, are only means, and for the use of these tools, of these means, the designer is the main responsi- ble, if not the sole responsible. Well, where are these dangers of the misuse of the computers coming from ? Partly, they derive from the cahotic development that we have witnessed on the computer work. This development has been quite on an anarchic base, so to speak, and it has not yet been integrated within the communication structure, the communication fabric of our society. This is characteristic of every new technical tool that is introduced. If I may borrow from Dr Pfaffin ger' s paper, thus coming back to the very first one of our colloquium to close the circle, I may refer to the example of motor-cars. With the advent of motor-cars, at the beginning there was complete freedom : one who purchased a new car could go wherever he wanted. He had no circulation rules to follow, and so on. But nowadays, we know that this is impossible now. We have to exercise not only new skills; it is not suf ficient to learn to drive a car. First of all, the car must be chosen in

relation to its use. You will never use a sport car if you have to go across the country. New sets of regulations and checks must be added to the fabric of our society, if the input of these new tools is to be a beneficial one and not a harmful one. For instance, with the advent of motor-cars, we had to set up roadworthiness checks, traffic lights, traffic police, car insurance, legal liabilities (of drivers of course, not of cars), and so on. We had also to undertake the education of the users, educations in the new skills of driving, but also in common good sense. For instance, one must not be carried away by his new car, so that he uses it even for going from his home to the newspaper kiosk 50 m. away. All of these aspects can be transposed more or less to the world of computers, and we have heard about them, so I would not repeat them. This is the situation. Our society is not yet copying efficiently with the impact of these new tools. We have to recognize this fact and urge other interested parties to help us in making these new tools compatible with the goals of every time and every society, that is a better life and a safer life for everyone. Thank you.