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JICABLE'07
Rapporteur's Session Report

B7 SESSION : HV/ EHV DC CABLES

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This session concerns the HVDC cables.
It is divided in 2 parts.
First part gives details on the setup projects of long HVDC cables and their installations. Second part treats about the space charges on the plaques and model HVDC cables.

The first three papers are on the HVDC cable :

B.7.1 : This paper concerns the deep water cables.
An important problem is about the large forces for installing the cables in deep water. The deepness varies from 50 meters to 100 meters. It's possible to reach 1500 meters and perhaps 2000 meters., always following the norms IEC 60840.In spite of the decreasing of the diameter of the conductor (about 3%) it is possible to reach these deepnesses.
So, these projects are very interesting.

B.7.2 : Here the project concerns the longest cable in DC (power 700 MW, +/- 450 kV),
losses 3,7%.
It is a linking between the Norway and Netherlands
The insulation thickness reaches 20 millimetres and the lighting impulse is 900 kV.
This project is also very interesting.

B.7.3 : Here, we have a HVDC co-axial cable of +/- 250 kV (integration).
An important advantage of this sort of cable is that it does not create a magnetic field outside the cable, the power is 180 MW and can reach 300 MW (section 1000 to 1600 mm^2).The thickness of main conductor insulation is 16mm and the return section insulation is 8 mm.
This project improves the surrounding of the cable.

The three following papers concern the space charges measurements in cables, model cables and plaques.

B.7.4 : These results came from the European project "Benefits of HVDC link".
The result show that it exists a threshold about 10 kV/ mm to inject space charges at high temperature. The authors found correlations between mini cables, cables and plaque for measuring the space charges (measured with PEA technique) with following conditions 40kV/mm, 1000s, temperature varying from 25 to 70ºC. The criteria for space charges is to make the sum with space charges positive and negative(modulus). It seems that the space charges depends very few with temperature.

B.7.5 : This paper tries to modelise the space charges distribution (measured by PEA technique) using the assumption of interface in a gradient of temperature. In this model no space charges appears when the conductivity and permittivity are constant.

B.7.6 : Here, the authors using always PEA technique found space charges in model cables of 10 cm long. With different semicon and an electric field varying from 20 to 60 kV/mm, temperature from 20ºC to 70°C, they found a space charges about some c/m^3.
It exists a correlation with real cables.
These last results show the interest of model cable.