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**C.8.1.3.****A new method for cable conductor temperature prediction under dynamic load**

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Cable engineers are under great pressure to increase power cable ratings so that they can reach their safety limits. Ironically, there is a trouble getting system operators to apply the heavy loads because the thermal models used in cable rating calculations need to accurately calibrate. Experience from many utilities has been that calculating cable conductor temperature, given soil ambient temperature, assumed soil thermal resistivities and typical actual load currents, almost always results in values less than what the classic calculations (IEC 60287, etc.) predict. The main reasons might be compounding effects of many conservative assumptions, for example, the conductor ac resistance, sheath losses and the effective soil thermal resistivities may be less than assumed. This makes the cable rating projection difficult because of these uncertainties.

In this paper, a new method is presented which can more accurately predict the cable conductor temperature under dynamic loads. The method is based on the cable surface temperature measured by thermal sensors or DTS and the environment temperature measured on-line. The load and surface temperature history of 12-18 hours is used in the calculation at the prediction time. The average environment temperature for the last 1-2 hours in conjunction with the predicted load profile is used in the calculation using a finite element technique. This method has been proved accurate in the laboratory tests on a 230 kV and a 400 kV cable. The conductor temperature for the next 1-5 hours can be predicted for any dynamic load patterns including emergent load of any level.