Boutre-Trans Project: 225kV AC underground cable installed in the South-East of France

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By the end of 2014, RTE (Réseau de Transport d'Électricité, company responsible for the electricity transmission in France) will be commissioning the 225kV AC underground cable Boutre-Trans in the south-east of France. With a length of 65 km, this is the longest underground link for such a high voltage level. In order to validate the cable model for transient studies RTE has performed field measurements and has established a partnership with Polytechnique Montreal to build and validate the cable model based on those results. This paper presents the Boutre-Trans project including the field measurements and the first attempt to simulate the cable system in electromagnetic transients simulation tool (EMTP-RV). Being installed in HDPE tubes, the air gap and tube will influence the propagation of intersheath modes on the cable. The cable outer insulator, air gap and HDPE tube form a multi-layer eccentric outer insulator which cannot be handled by the present Cable Constants in EMTP-RV. This paper presents an equivalent insulator model that allows considering the HDPE tube in an EMTP-RV simulation. The semiconducting layers screening core and insulator in Boutre-Trans cable influence the propagation of coaxial modes and are included in the calculation of series impedance and shunt admittance matrices. The grounding system (grounding rods used for impulse generator, oscilloscopes and metallic sheaths) affects the measured voltages and is thus included in the EMTP-RV simulations. The simulation results using the EMTP-RV cable model are compared with measurement results.