Seminario Dottorandi su “**HVDC cable systems**” (in inglese)

Prof. Ing. **Giovanni Mazzanti** (DEI)

sito docente <https://www.unibo.it/sitoweb/giovanni.mazzanti>

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Short abstract

High voltage direct current (HVDC) cable systems have been for decades the best solution for long-distance submarine transmission links. However, nowadays the improved performance of AC/DC converters and the environmental concerns about overhead lines have made HVDC cable transmission more and more attractive worldwide, leading to a quasi-exponential growth of installed HVDC cable lines – both underground and submarine – in the last twenty years. In this scenario, the relatively new extruded HVDC cable systems have become more and more competitive compared with the traditional oil-paper HVDC cable systems, although the latter have totaled much more service experience, reaching the top values of voltage (600 kV) and power ratings per bipole (1 GW and more).

In this seminar, first the general concepts about HVDC cable transmission are provided, focusing on the pros and cons of HVDC vs. HVAC (high voltage alternating current) cable systems and on the two main types of AC/DC and DC/AC converters used with HVDC cable systems, i.e. Line-Commutated Current Source Converters (LCC) and Self-Commutated Voltage Source Converters (VSC). Then the main types of HVDC cables are examined, i.e.: Mass-lmpregnated Non-Draining, Oil-Filled, Polypropylene Paper Laminate, Extruded-insulation cables, with details about oil-paper (lapped) insulation technology and extruded insulation technology. Thereafter, some elements of testing procedures of HVDC extruded cable systems according to International Standards (CIGRE Technical Brochure 496:2012, CIGRE Technical Brochure 636:2015, IEC 62895:2017, IEEE 1732:2017) are given. The seminar is closed with some hints at the earth electrodes for HVDC cable systems.