

Part III

Direct Current

Compared to the conventional HVDC transmission system, the system structure and operating mode of the UHVDC transmission system are more complicated, and there are also more overvoltage conditions and types for the UHVDC power transmission system, so it is required to study the overvoltage mechanism and control methods specifically. For the UHVDC insulation coordination, it is required to consider more equipment. The insulation coordination among equipment, configuration of arresters, and design of the external insulation are also more complicated; moreover, the UHV equipment manufacturing difficulty has reached the limit of the current manufacturing technology, but the rational insulation coordination design can help to solve the problem. Additionally, the UHV transmission system faces the adverse influences imposed by long air clearance insulation saturation, high altitude, etc., resulting in reduction of relative insulation margin in the UHVDC transmission system, so the UHV transmission system imposes higher requirements for the overvoltage limit and insulation coordination. Furthermore, the electromagnetic environment issue for the UHV transmission projects has become one of important factors having influence on the power grid construction and development. What is more, there are also some differences between the EHV protection and the UHV protection. With respect to the aforementioned problems in aspects, it is worthwhile to carry out an in-depth research. This section will focus on a discussion of such issues in the process of UHVDC transmission as overvoltage mechanism and its control method, insulation coordination of converter stations and transmission lines in UHVDC system, electromagnetic environment, the UHVDC system protection, etc.