

# Paris Session 2022



## Cable coupling and possible mitigations

Study Committee B4

PS 1-4: Harmonic and filtering and  
interference in HVDC Application

Question 1.7

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**HITACHI**  
Inspire the Next

# Learning from studies and industrial experiences

- The electromagnetic interference between HVDC and HVAC underground cables is not observed risky in steady-state harmonic frequency range
  - Relatively low source harmonics, especially for VSC
  - Low mutual impedance, and further damping in victim system
  - Noticed less risky in practical projects
- Attention to be paid to induced fundamental component from HVAC to HVDC cables and be further investigated
  - Saturation of HVDC converter transformer by cross-modulation due to the DC side fundamental current
  - Tolerance of the saturation from HVDC systems
- Electromagnetic interference between HVDC and HVAC cables due to transient is observed non-negligible
  - High induced voltage due to fault current
  - The immunity against the coupling of transient needs to be investigated

## Possible mitigation actions

- In principle to mitigate EMI by reducing the distances separately between DC poles and AC phases, making them small enough compared to the distance between DC and AC cables
- General way to reduce the electromagnetic interaction
  - Shorter length of parallel cables
  - Larger separation between HVDC/HVAC cables
  - Small earthing resistance of cable sheath
- For an existing cable system
  - A better earthing for the cable sheath
  - Such as lower resistance of cable sheath earthing
- Without any change of hardware, to damp the induced components such as by the HVDC control system

Group Discussion Meeting

