The increased penetration of new technologies has heightened the variability of the grid, impacting the efficiency of damping controller (DC) devices. New adaptable approaches are necessary.

Current adaptable WADCs face some challenges, such as dependency on up-to-date models for model-based approaches and security constraints for real-time fine-tuning in the case of data-driven approaches.

How can inverter-based resources (IBR) be optimally used as DC only when necessary?

**COORDINATION OF DAMPING CONTROLLERS**

The coordination seeks the on/off switching combination of all DCs that best improves grid damping for the current operating condition and disturbance. This is achieved by identifying the coordination that minimizes the total action, a metric based on the kinetic energy released by synchronous generators.

![Optimal controller coordination](image)

**DATA-INFORMED COORDINATION**

To achieve coordination, a deep neural network is trained as a total action function approximation algorithm. This network learns the nonlinear relationship between inputs, DC combinations, and total action.

![Data collection and training process](image)

**EVALUATION**

Comparison between MBC and DIC for short-circuit at bus: (a) 157, and (b) 69.

**REFERENCES**


**REMARKS**

- The results show that adaptability can be achieved by using a DNN as a switching law to find the combination that minimizes TA.
- It is not necessary to consider all possible disturbances and operating conditions; a carefully selected subset has been proven to be sufficient for generalization.
- The computational time of the coordination is 78 ms per 1,000 tests.
- Coordination allows for the efficient use of IBR as DC.