This paper presents a distributed cooperative control-based (DCC) power management algorithm for a hybrid AC/DC microgrid. The proposed algorithm for a hybrid microgrid system controls the power flow through the interface converter between the AC and DC microgrids. This algorithm allows power sharing between the distributed generators in the microgrid according to their power ratings. Moreover, it enables the fixed scheduled power delivery through the interface converters in both directions at different operating conditions while maintaining good voltage regulation and improving the frequency profile.

### PROPOSED DCC FOR HYBRID AC/DC MICROGRID (CONT'D)

\( \Delta v_C^{DC} \rightarrow \) is responsible for maintaining the scheduled power through the interface converter or maintaining the same per-unit power sharing by all distributed generation in the hybrid microgrid. The update protocol for the second correction factor is illustrated in the following figure:

When the interfacing converter is injecting power from the DC subgrid to the AC subgrid, the reference frequency, \( \omega^* \), is updated according to the flowing equation:

\[
\omega^* = \omega_{ref} + \Delta \omega_1 + \Delta \omega_2
\]

### SIMULATION RESULTS

Two case studies were considered to validate the proposed method:
- Case 1: Fixed scheduled power flow through the interfacing converter
- Case 2: All the distributed generation units in the hybrid AC/DC microgrid sharing power according to their ratings

### CONCLUSION

A distributed cooperative control scheme for an AC/DC hybrid microgrid has been proposed. Key features of the proposed algorithm:
- Controls the power flow through the interfacing converter between the AC and DC subgrids.
- The control algorithm uses limited information exchanged with some of the distributed generation in both the AC and DC subgrids to achieve the control objectives, i.e.,
  - Scheduled power flow through the interface converter or
  - Load sharing by the distributed generation units accruing to their ratings.
- The simulation results show that the proposed DCC enables control of the power flow through the interface converter in different modes of operation at different operating conditions while maintaining good voltage regulation in both subgrids.

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**REFERENCES**

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