TECHNOLOGY SUMMARY

Optimal power allocation and sharing algorithm

Optimal power allocation and sharing algorithm for maximizing efficient operation of a parallel multi-unit power conversion system.

THE TECHNOLOGY

Power Conversion Systems (PCS) ensure power conditioning when converting electric energy from one form to another. The deployment of Parallel Multi-Unit Power Conversion Systems (PMPCS) architecture, consisting of parallel sub-PCSs (Figure 1), is becoming increasingly popular in many industrial applications (e.g. renewables, electric vehicles, and energy storages) due to PMPCS's

- *reliability* – while supplying critical/large loads and if some units fail to operate;
- *expandability* - units can be added or removed during upgrading and downgrading activities;
- *operational flexibility* - multiple parallel units offer greater installation and operational flexibility;
- *ease of maintenance* - maintenance is easier and doesn't interrupt the system operation; and
- *cost efficiency* - allow for a combination of industrial scale units rather than designing a large scale unit.

However, due to technical and/or economic issues (e.g. system upgrading, maintenance, etc.), the nominal power of each sub-PCS unit and its efficiency curve can differ from other sub-PCS units in the PMPCS thus impacting the total efficiency index of the conversion system.

Researchers at the International Energy Research Centre (IERC) have developed a generic optimal power allocation/sharing algorithm (OPASA) that can guarantee an efficient operation of a PMPCS where each sub-PCS unit may have a different nominal power rating and different efficiency curves. The algorithm may also be applied to power generation systems consisting of multiple parallel power generation units.

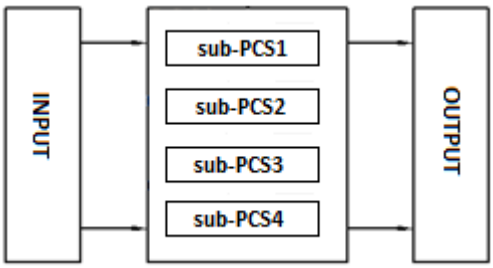

Figure 1 – Parallel multi-unit power conversion system (PMPCS)

OPASA consists of offline and online design parts to determine the contribution of each sub-PCS unit to the total output of the system in real-time. As a result the PMPCS operation efficiency improves and energy losses are minimised. The proposed algorithm may be easily applied to PMPCs in different industrial applications, particularly hybrid systems where the power input comes from different sources.

ABOUT THE TYNDALL NATIONAL INSTITUTE

The IERC is an industry-led collaborative research centre in the field of integrated sustainable energy systems. The IERC delivers world leading collaborative research to meet global societal needs for secure, affordable and sustainable energy services. It enables partners to develop new products and services that will ensure real energy demand reductions across society.

FIELDS OF APPLICATION

Electrical conversion systems, power generation systems, renewable energy systems, electric vehicles, diesel engine power generation systems, energy storage, etc.

OPPORTUNITIES

- Non-exclusive licensing
- Research collaboration
- Consultancy

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