TRANSNATIONAL ACCESS
USER PROJECT FACT SHEET

USER PROJECT

Acronym	ARTUPS
Title	Adaptive reclosing technique for providing uninterrupted power supply to microgrid system
ERIGrid Reference	05.015-2018
TA Call No.	5

HOST RESEARCH INFRASTRUCTURE

Name	TECNALIA (Smart Grid Technologies Laboratory)		
Country	Spain		
Start date	14/06/2019	**Nº of Access days**	15
End date	07/07/2019	**Nº of Stay days**	24

USER GROUP

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European Research Infrastructure supporting Smart Grid Systems Technology Development, Validation and Roll Out

1. USER PROJECT SUMMARY (objectives, set-up, methodology, approach, motivation)

1. **Objectives:** To overcome the drawback of conventional reclosing technique using proposed adaptive reclosing microgrid system.

2. **Set-up:** The set-up diagram is shown in Fig. 1.

3. **Methodology:** The proposed technique is tested using different test cases in both grid as well as in islanded mode of operation.
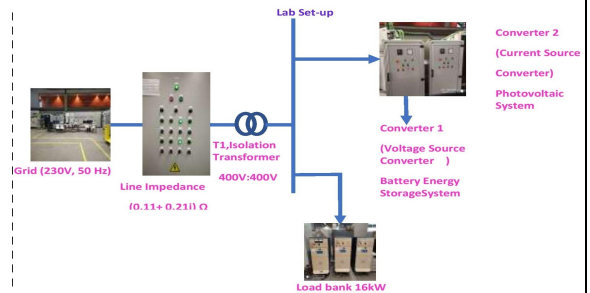

Fig. 1 Experimental set-up for offline validation of ARTUPS algorithm

4. **Approach:** The components involved in the approach are shown in Table I.

Implementation details	Equipments	Communication involved	Monitoring aspects
• MATLAB version 2013 or above • PSS/E • RT-Lab	• Computer with configuration: 6 GB RAM, 3.2 GHz speed, Window 7 or above (64 bit) • Opal-RT (ePHASORSIM) • Matlab 2013 and above • Converters panel	• Purchased code to fetch the streamed-out signal to RT-Lab • SADF library to fetch the signal to MATLAB • TCP/IP for internet channel	• Load switching operation and capacitor switching • Faulty section identification • Fault classification based on logic • Fault clearance detection • Synchronism check operation

Table I. Components involved in the approach

5. **Motivation:** In this work, the main motivation of the research stands on the detection of fault and fault classification which stands on the superimposed component-based technique. The method is tested for different fault types, fault positions and also tested for various switching events like load switching of active as well as reactive power load and capacitor switching operation. Results prove the efficacy of the proposed method.

2. MAIN ACHIEVEMENTS (results, conclusions, lessons learned)

1. Results:

As mentioned before, the testing of ARTUPS has been done for offline validation of proposed adaptive reclosing operation and fault classification. The main goal is the validation of ARTUPS for reduction of outage time and improvement of reliability of power supply. The real-time monitoring of the test signals for voltage and current allows the identification of faulty section and its isolation from the healthy part. An abrupt increase in second order harmonic current values for faulty phase and healthy phase clearly indicates the fault clearance time which is shown in Fig. 2–3.
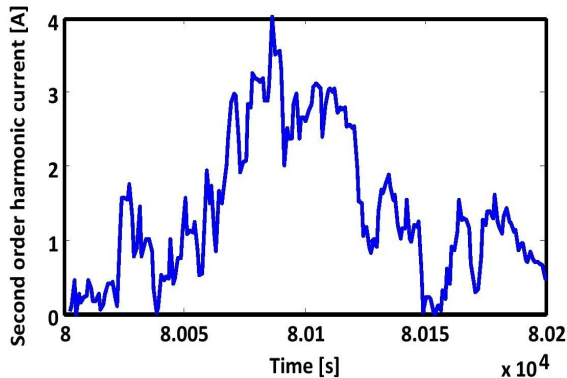
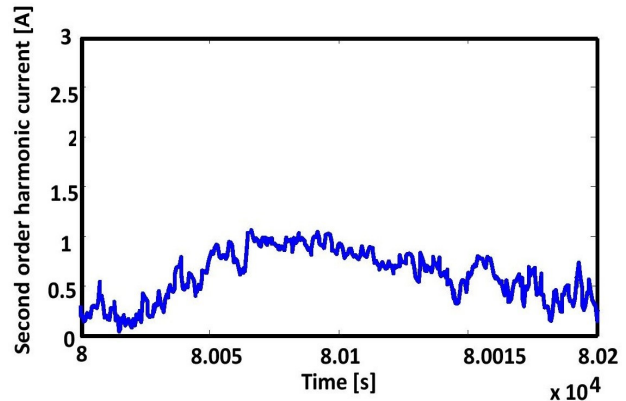Fig. 2. Second order harmonic current of faulty phase

Fig. 3. Second order harmonic current of Healthy phase

The fault clearance detection is observed successfully by measuring the THD of current supplied by faulty and healthy phase from BESS side when SLG fault occurs as shown in Fig. 4.

Fig. 4. THD of current supplied by BESS at the instant of fault clearance when SLG fault occurs
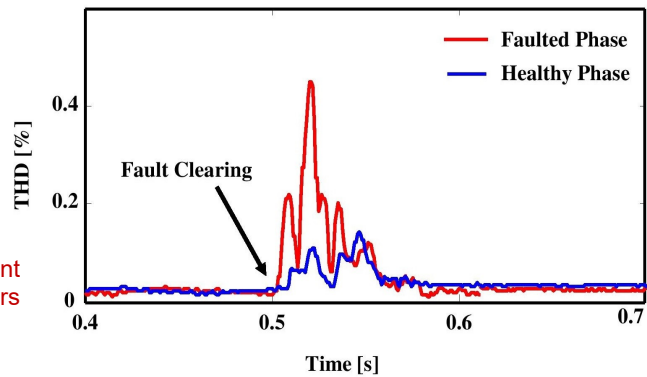
2. Conclusions:

- ARTUPS is effective and accurate in detection of fault and fault classification.
- The algorithm accurately verifies the fault clearance detection and synchronism check process using frequency and phase angle.
- ARTUPS operation is found to be accurate during various switching operation and different system configuration including islanding as well as grid connected modes.
- Further improvement is needed in ARTUPS algorithm to increase its speed of operation of circuit breaker to reduce the transients occurring due to single pole operation.

3. PLANNED DISSEMINATION OF RESULTS (journals, conferences, others)

Results will be shown in the form of conference and will be best tried to publish in journal as well with the collaboration of user group members, including the project manager and his team mates.

4. PLANNED DISSEMINATION OF RESULTS THROUGH ERIGRID CHANNELS

Contact erigrid-ta@list.ait.ac.at to organise promotion of your results

Fact Sheet and Technical Report will be publicly available through the ERIGrid project website.