

Development of a Socially Aware Demand Response Algorithm for Management of Low Voltage Distribution Networks

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Key Phrases: Dynamic Operating Envelope (DOE),
Demand Response (DR)

Extending Work by Gayan Lankeshwara on
DOE Aware Demand Response.

Project Goals:

- Validation of DOE Software and Formulation
- Validation of DOE Aware DR
- Application to DOE Construction and DR to a Larger Real Network from EQL
- Assessment/Development of Socially Aware Demand Response

Software Re-implemented Using:

- Julia Programming Language
- OpenDSSDirect.jl
- JuMP and Ipopt

Upgrade in Performance of
simulation from:
~15-20min to ~5min

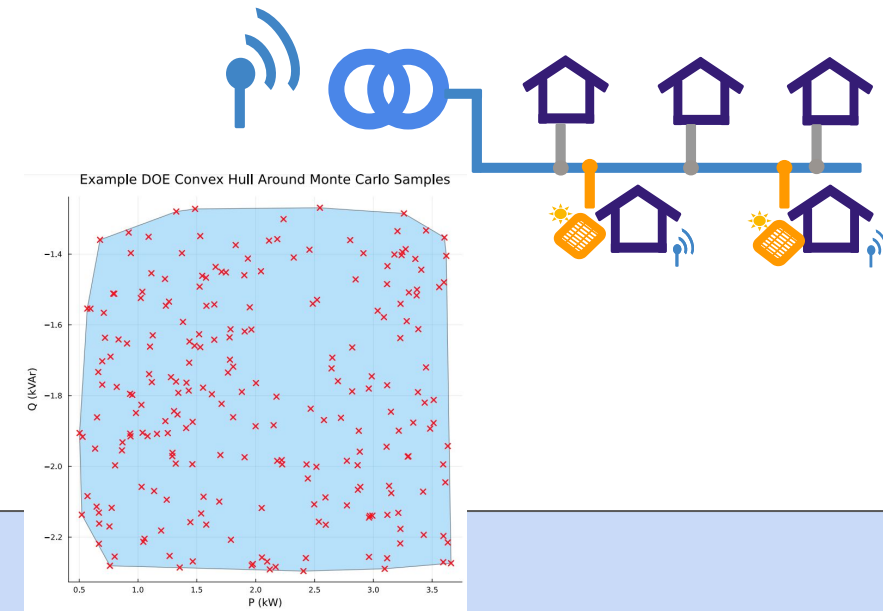
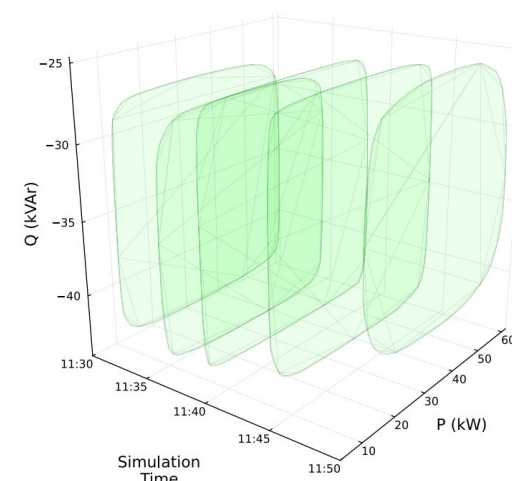
New network of **144** customers from **105**

julia

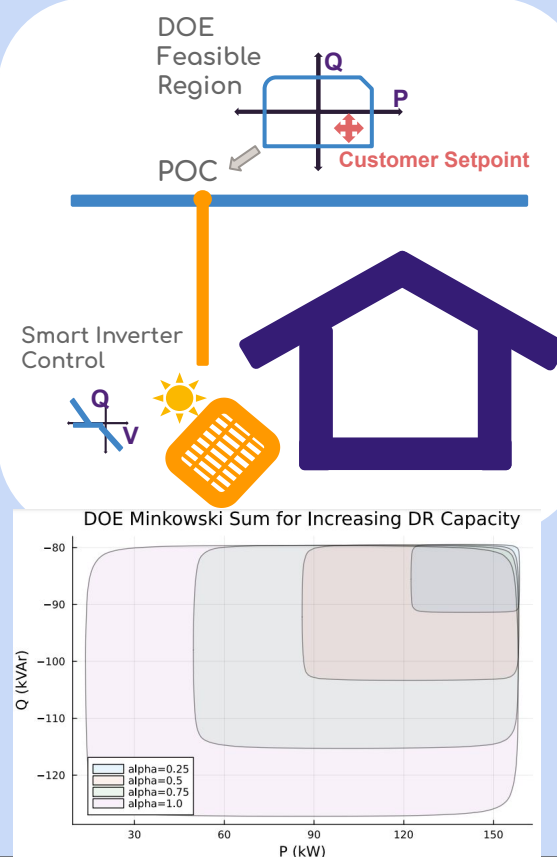


OpenDSSDirect.jl

JUMP

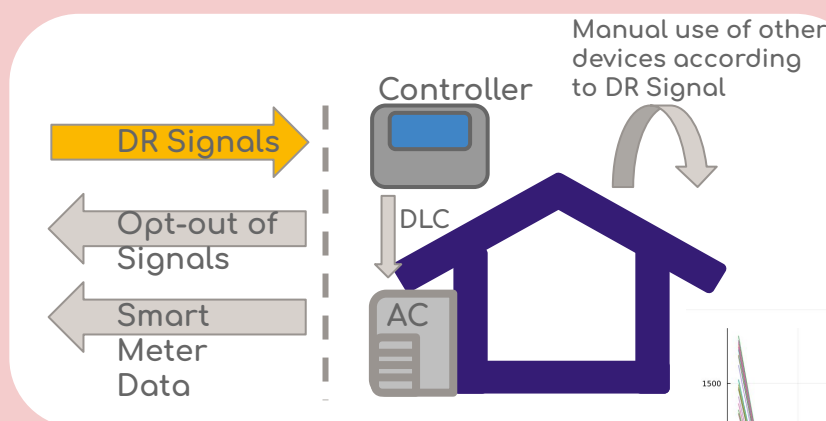


Dynamic Operating Envelopes



- Dynamic Limits assigned to customers to **mitigate effects of distributed generation (PV)**
- Acts as bounding region for DR capacity
 - **Larger area = more capacity for response**
 - **Assigning larger area to socioeconomic** locations with more capacity for response allows more upstream flexibility
- Constructed through:
 - Sampling the P-Q space
 - Validating against breaching of voltage limits (in QLD +10% -6% V p.u.)

Demand Response



- Customer DR requests for Generation/Consumption - **financial benefit to customer**
- Solved Using **Alternating Direction Method of Multipliers (ADMM)**:
 - Guaranteed convergence with convex optimisation problem

