



Precise Correction of Current Zero-Crossing Distortion of Totem Pole PFC Converter

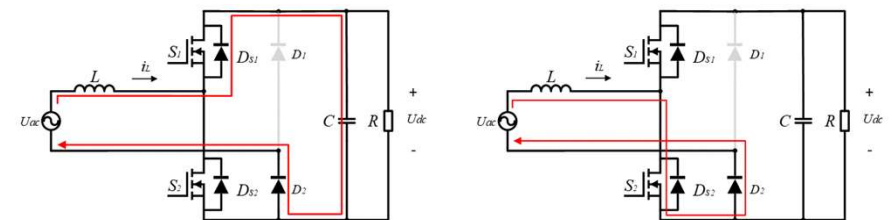
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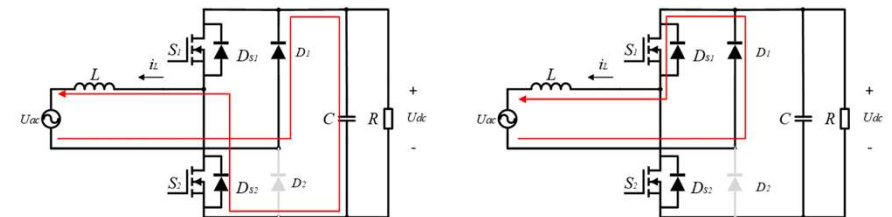
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Background

- Electrical Vehicles (EV)
- High-performance Onboard Charger PFC Converter is essential in OBCs
- **Totem-Pole PFC** rectifier's advantages
 - high efficiency
 - high power density
- Operation Principle



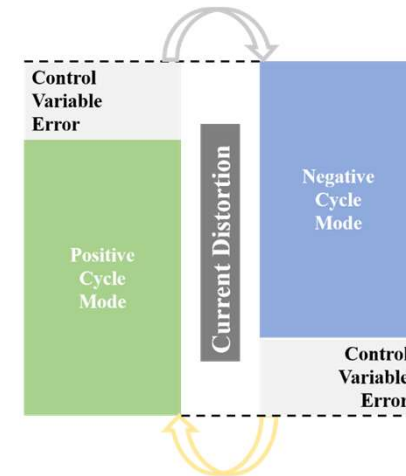
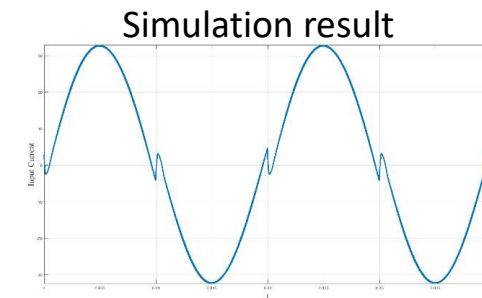
Positive Half Cycle



Negative Half Cycle

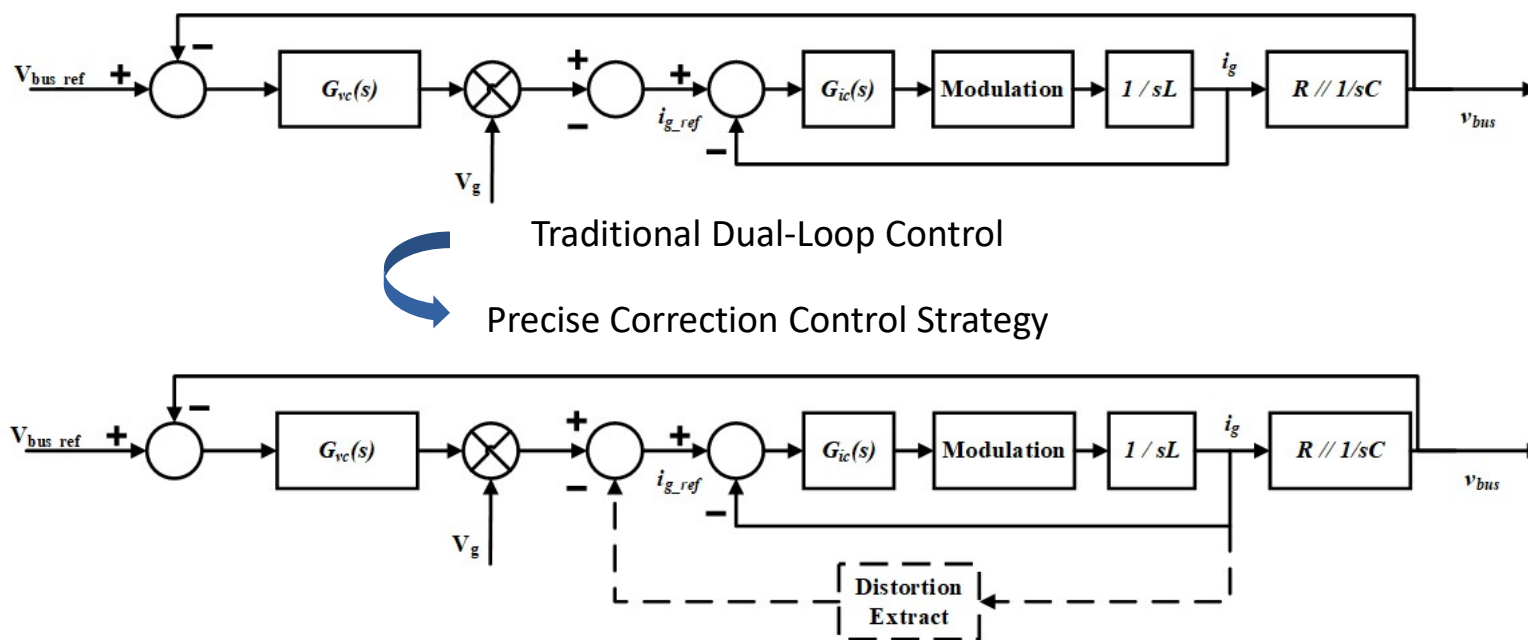
Phenomenon & Analysis

- The Totem-Pole PFC converter is prone to current zero-crossing distortion.
 - Low power factor
 - Reduced efficiency
 - Electro-magnetic interference
- Cause
 - Half cycles coordinate with equivalent Boost control loop with same structure
 - After zero crossing, the control variables can not reset to original status timely
 - Conclusion: the speed of the controller's instantaneous response is too low



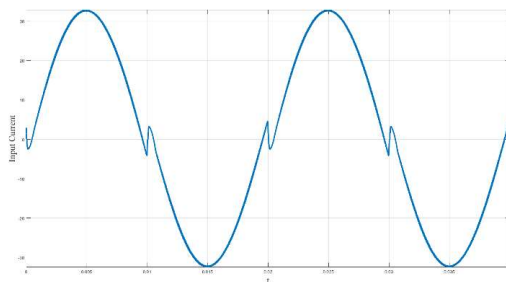
Precise Correction for Current Distortion

- Control Strategy Improvement

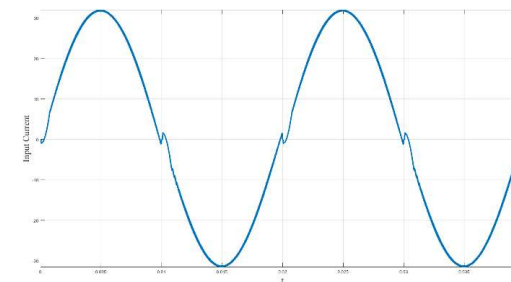


Simulation Verification

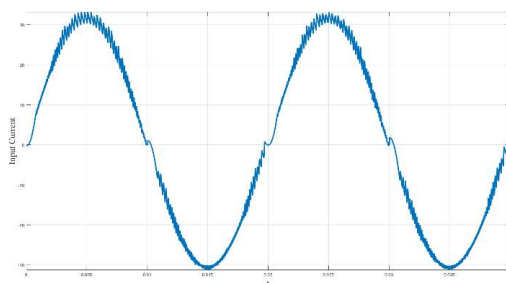
Original Distorted Current



Soft Commuting Correction Method



Increased Bandwidth Method



Precise Correction Method

