Economic Model Predictive Controllers in a Micro-grid with Hydrogen Storage

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Abstract

The objective of this project is to make a optimal economic control of a microgrid with several storage systems and several renewable generation systems. Actually the concept of microgrid is taken a great relevance due to let the systems to have a certain energy autonomy. This energy autonomy means to save energy. Therefore the main objective is to get the best energy management of this type of grids. In order to get it, it’s proposed several model predictive controllers.

Usually this grids are controlled by PID controllers Ngamroo [2012] or Fuzzy PID controllers Chaiyatham [2012] that don’t take into account any type of constraints. Thus the control of this grids is not optimal and have to use saturators and other elements to avoid that some signals exceed the limits imposed by technological constraints. This disadvantages are easily solved by the proposed MPC controller.
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Nomenclature

Roman Symbols

- **DG**: Distributed Generator.
- **DG**: Distributed Generators
- **GPN**: General Power Network
- **LRSM**: Linearization of the Reliable Simulation Model.
- **MHL**: Metallic Hidrure Level.
- **P\text{bat}**: Battery power.
- **P\text{dem}**: Demanded power.
- **P\text{ez}**: Electrolyzer power.
- **P\text{fc}**: Fuel cell power.
- **P\text{grid}**: GPN power.
- **P\text{H}_2**: Hydrogen power.
- **P\text{renw}**: Renewable generated power.
- **PB**: Power Bus
- **RSM**: Reliable Simulation Model.
- **SOC**: State Of Charge