The main idea for dynamic models for SDG, it is to develop simple and more realistic models for the power and utility applications. Also, the proposed models have the advantage to be determined using the P-V and V-I characteristic curves. Also, these models can be used for power flow analysis.

**Linear Reoriented Coordinates Method**

The Linear Reoriented Coordinates Method, it is a novel simple method to approximate the maximum value for functions of the family, \( f(x) = x \cdot g(x), x \in [0, x_{\text{max}}] \), for \( f(x) \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists \exists 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**Analysis of Nonlinear Phenomena for dc-dc Converters**

The interest for this project is to develop a theory that it can explain the nonlinear phenomena for dc-dc converters using different types of controllers. Some problems can be bifurcations, chaotic behavior, period doubling. At the same time, it is important to model the dc-dc converters taking in consideration the power losses. The results will be analyzed using Poincare maps, phase portraits, non-smooth Lyapunov analysis and simulations to test and predict the nonlinear phenomena.

**Nonlinear Control Design for a Fuel Cell, Solar DG**

The main idea, it is to test the type of stability for different DG using Lyapunov analysis, singular perturbations, and other types of nonlinear analysis.