

This work addresses the common problem of distributing reactive power among multiple synchronous generators in power plants. Multiple synchronous generators within the same power generation facility are often utilized to feed a power transmission line. Individually controlling each generator may not be adequate for proper distribution of reactive load among multiple generators. Some possible issues of such a strategy include the generation of circulating currents, a low power factor, or generators running at the limit of their capabilities. The focus of this work is on the design of a supervisory control strategy for interconnected synchronous generators in power plants with the aim of avoiding those issues. The design is facilitated by constructing a new modified power factor that is smooth and monotonically decreasing as a function of reactive power and provides a clear indication of whether the reactive power is leading or lagging. The proposed strategy is implemented in cascade with the existing Automatic Voltage Regulators widely employed to provide voltage output stability. The effectiveness of the proposed strategy is discussed by providing experimental results comparing the reactive load distribution before and after the deployment of such a strategy in a large power plant.