

A distribution static compensator (DSTATCOM) is used for load voltage regulation, and its performance mainly depends upon the feeder impedance and its nature (resistive, inductive, stiff, nonstiff). However, a study for analyzing voltage regulation performance of DSTATCOM depending upon network parameters is not well defined. This paper aims to provide a comprehensive study of design, operation, and flexible control of a DSTATCOM operating in voltage control mode. A detailed analysis of the voltage regulation capability of DSTATCOM under various feeder impedances is presented. Then, a benchmark design procedure to compute the value of external inductor is presented. A dynamic reference load voltage generation scheme is also developed, which allows DSTATCOM to compensate load reactive power during normal operation, in addition to providing voltage support during disturbances. Simulation and experimental results validate the effectiveness of the proposed scheme.