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Abbreviations

Statcom	Static synchronous compensators
FACTS	Flexible AC Transmission systems
SVC	Static var compensators
SSSC	Static series var compensators
IGBT	Insulated gate bipolar transistor
GTO	Gate turn-off thyristor
SVG	Static var generator
TCSC	Thyristor-Controlled series capacitors
MWP13.8	MARWI POWER PLANT13.8KV
GAR11	GARI 11KV
ROS11	ROSSERIES 11KV
KHN11	KHARTOUM NORTH 11KV
SNP11	SENNAR POWER PLANT11KV
MWP500	MARWI POWER PLANT500KV
MRK500	MRKHIAT500KV
KAB500	KABASHI 500KV
ATB500	ATBARA 500KV
GAR220	GARI 220KV
ROS220	ROSSERIES 220KV
MWP220	MARWI POWER PLANT220KV
KAB220	KABASHI 220KV
SNJ220	SENNAR JUNCTION 220KV
MAR220	MARINJAN 220KV
GAD220	GIAD 220KV
KLX220	KILO X 220KV
JAS220	JABEL AWLIASTATION220KV
IBA220	IED BABIKER 220KV

Abstract

Power systems suffer greatly from voltage instability especially due to excessive consumption or injection of reactive power by the system elements and the consumers 'loads. The voltage instability caused by the variation in their active power requirement of the system's elements and the consumers' loads either result in excessive high or low voltage which may cause damage to the system and the consumer's load since the system elements and the consumers' loads are design to operate within a specific voltage range transmission lines are heavily loaded and the system stability becomes a power transfer-limiting factor. Flexible AC transmission systems (FACTS) controllers have been mainly used for solving various power system steady state control problems. Flexible AC transmission systems or FACTS are devices which allow the flexible and dynamic control of power systems. Enhancement of system stability using FACTS controllers has been investigated.

STATCOM is a static synchronous generator operated as a shunt-connected static VAR compensator whose capacitive or inductive output current can be controlled independent of the ac system voltage. The STATCOM, like its conventional counterpart, the SVC, controls transmission voltage by reactive shunt compensation This thesis discussed the role of STATCOM in VAR compensation and their effect in improving voltage profile. In this project Sudan national grid under peak load was studied and amount of VAR compensation was found. Also a suitable location and sizes of STATCOM were selected

المستخلص

تعاني أنظمة القدرة بصورة كبيرة من مشكلة عدم استقرارية الجهد بسبب الزيادة الكبيرة في استهلاك او حقن القدرة التخيلية في أنظمة القدرة بواسطة مكونات الشبكة نفسها و الأحمالزعدم استقرار الجهد يسبب بواسطة طلب القدرة الظاهرية التي تحتاجها انظمة القدرة والاحمال مما ينتج زيادة اونقصان الجهد مما يسبب تعطيل للنظام او لأحمال المستهلكين لأنها مصممة للعمل في نطاق جهود معينة.خطوط النقل بدورها أصبحت التحميل عليها كبير واستقرارية الجهود أصبحت عامل مهم في تدفق الاحمال في انظمة القدرة.معوضات القدرة الرد فعلية اصبحت تستخدم بصورة اساسية في الفترة الأخيرة لحل مشاكل استقرارية أنظمة القدرة.معوضات القدرة الرد فعلية الحديثة هي اجهزة تمكن من التحكم في أنظمة القدرة بصورة مرنة وديناميكية.

تحسين استقرارية أنظمة القدرة باستخدام معوضات القدرة الرد فعلية تم اكتشافه واستخدامه بصورة كبيرة في الاونة الاخيرة ومنها معوض القدرة التزامنية الاستاتيكية وهو يعمل كمولد قدرة رد فعلية او ممتص لها وهو يعمل بالتوازي مع انظمة القدرة واعتمادا على جهد منظومة القدرة. وهو يعمل على التحكم في جهود خطوط نقل القدرة في الدراسة التي نناقشها الهدف الاساسي من استخدام معوض القدرة الرد فعلية التزامنية هوتعويض نظام القدرة بالقدرة الرد فعلية المطلوبة وتأثيرها في تحسين مستوى الجهود و تم أستخدام الشبكة السودانية القومية في حالة اقصى احمال كحالة دراسة أيضا تم دراسة انسب محطات يمكن ان تستخدم فيها مهوضات القدرة الرد فعلية التزامنية والمعوضات المناسبة لها.