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# A Review on the Power System Stability Enhancement using FACTS Controllers

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**ABSTRACT**
Thispaperpresentsexhaustivereviewofvariousconceptofvoltageinstability,maincausesofvoltageinstability, classification of voltage stability, dynamic and static voltage stability analysis techniques, modeling,shortcomings,inpowersystemsenvironments.Italsoreviewsvariouscurrenttechniques/methodsforanalysisof voltage stability in power systems through all over world. This paper presents a comprehensive review on theresearch and developments in the power system stability enhancement using FACTS damping controllers.Several technical issues related to FACTS installations have been highlighted and performance comparison ofdifferentFACTScontrollershasbeendiscussed.Inaddition,someoftheutilityexperience,real-worldinstallations,andsemiconductortechnologydevelopment havebeenreviewedandsummarized.

## I. INTRODUCTION

Sincethedevelopmentofinterconnectionoflargeelectricpowersystems,therehavebeenspontaneous system oscillations at very low frequencies in order of 0.2–3.0 Hz. Once started, theywould continue for a long period of time. In some cases, they continue to grow causing systemseparationduetothelackofdampingofthemechanicalmodes[1;2].Inthepastthreedecades,power systemstabilizers(PSSs) havebeenextensivelyusedtoincreasethesystemdampingforlowfrequency oscillations. The power utilities worldwide are currently implementing PSSs as effectiveexcitation controllers to enhance the system stability [1–12]. However, there have been problemsexperienced with PSSs over the years of operation. Some of these were due to the limited capabilityof PSS, in damping only local and not inter area modes of oscillations. In addition, PSSs can causegreat variations in the voltage profile under severe disturbances and they may even result in leadingpowerfactoroperationandlosingsystemstability[13].Thissituationhasnecessitatedareviewofthetraditionalpowersystemconceptsandpracticestoachievealargerstabilitymargin,greateroperatingflexibility,andbetterutilizationofexistingpowersystems.

FlexibleACtransmissionsystems(FACTS)havegainedagreatinterestduringthelastfewyears, dueto recent advances in power electronics. FACTS devices have been mainly used for solving variouspower system steady state control problems such as voltage regulation, power flow control, andtransfer capability enhancement. As supplementary functions, damping the inter area modes andenhancingpowersystemstabilityusingFACTScontrollershavebeenextensivelystudiedandinvestigated.Generally,itisnotcost-effectivetoinstallFACTSdevicesforthesolepurposeofpowersystem stability enhancement. In this work, the current status of power system stability enhancementusing FACTS controllers was discussed and reviewed. This paper is organized as follows. Thedevelopment and research interest of FACTS is presented in Section 2. Section 3 discusses thepotential of the first generation of FACTS devices to enhance the low frequency stability while thepotential of the second generation is discussed in Section 4. Section 5 highlights some importantissuesinFACTSinstallationssuchaslocation,feedbacksignals,coordinationamongdifferent controlschemes,andperformancecomparison.

## II. FACTS DEVICES

**2.1.Overview:**

In the late 1980s, the Electric Power Research Institute (EPRI) formulated the vision of the FlexibleAC Transmission Systems (FACTS) in which various power-electronics based controllers regulatepowerflowandtransmissionvoltageandmitigatedynamicdisturbances.Generally,themainobjectivesofFACTSaretoincreasetheuseabletransmissioncapacityoflinesandcontrolpowerflowover designated transmission routes. Hingorani and Gyugyi [5] and Hingorani [6; 8] proposed theconcept of FACTS. Edriset al. [18] proposed terms and definitions for different FACTS controllers.There are two generations for realization of power electronics-based FACTS controllers: the firstgeneration employs conventional thyristor-switched capacitors and reactors, and quadrature tap-changingtransformers,thesecondgenerationemploysgateturn-off(GTO)thyristor-switchedconverters as voltage source converters (VSCs). The first generation has resulted in the Static VarCompensator(SVC),theThyristor-ControlledSeriesCapacitor(TCSC),andtheThyristor-ControlledPhaseShifter(TCPS)[10;11].ThesecondgenerationhasproducedtheStaticSynchronousCompensator (STATCOM), the Static Synchronous Series Compensator (SSSC), the Unified PowerFlowController(UPFC),andtheInterlinePowerFlowController(IPFC)[12–15].ThetwogroupsofFACTS controllers have distinctly different operating and performance characteristics. The thyristor-controlled group employs capacitor and reactor banks with fast solid-state switches in traditionalshuntorseriescircuitarrangements.Thethyristorswitchescontroltheonandoffperiodsofthefixedcapacitorandreactorbanksandtherebyrealizea variablereactive impedance.Exceptforlosses,theycannot exchange real power with the system. The voltage source converter (VSC) type FACTScontroller group employs self-commutated DC to AC converters, using GTO thyristors, which caninternally generate capacitive and inductive reactive power for transmission line compensation,without the use of capacitor or reactor banks. The converter with energy storage device can alsoexchange real power with the system, in addition to the independently controllable reactive power.The VSC can be used uniformly to control transmission line voltage, impedance, and angle byprovidingreactiveshuntcompensation,seriescompensation,andphaseshifting,ortocontroldirectlythe real and reactive power flow in the line [15]. In the paper, a framework of a new SVQC conceptthat could be applied to Slovenian power system is envisioned. The Slovenian power system has apeak load of 1700 MW and comprises some 30 generators. They operate decomposed in separategenerating companies, which could besides energy offer the power system ancillary services as well.Deregulation in the Slovenian power system requires the power producing companies to reconsidertheir options in the market. In the decomposed power system regarding generators, it would be ofadvantage to conceive a secondary voltage and reactive power control system adapted to theirorganization structure. The paper addresses an extreme decomposition of the secondary voltagecontrol system adapted to the above goals. The SQVC-s should be attached to the generator or to thegenerator-transformer block and adapt the reference voltage for the primary excitation controller tothe power system requirements and limitations. That way, the generating companies would obtain apowerful tool to enter the ancillary services market regarding the power system voltage support andreactive power. Especially independent power producers could benefit greatly from the possibility oflocalcontrolof their voltageandreactivepower.

## III. CLASSIFICATION OF FACTS CONTROLLERS

**CoordinationTechniques**

A. by Placement of FACTS Controllers in Power Systems References [3]-[5], [14], classifythree broad categories such as a sensitivity based methods, optimization based method, and artificialintelligencebasedtechniquesforplacementofFACTScontrollersfromdifferentoperatingconditionsviewpointinmulti-machinepower systems.

**1) SensitivityBasedMethods:**

There are various sensitivity based methods such as a modal or Eigen-value analysis, andindex method. An Eigen value analysis approach has been addressed for modeling and simulation ofSVCandTCSCtostudytheirlimitsonmaximumloadabilitypointin[11],[25].Anewmethodology has been addressed for the solution of voltage stability when a contingency has occurred, usingcoordinatedcontrolofFACTSdeviceslocatedindifferentareasofapowersystem.Ananalysisofthe initial conditions to determine the voltage stability margins and a contingency analysis to determinethe critical nodes and the voltage variations are conducted. The response is carried out by thecoordination of multiple type FACTS controllers, which compensate the reactive power, improvingthe voltage stability margin of the critical modes.An Eigen value analysis approach has beenaddressed for the problem of the most effective selection of generating units to be equipped withexcitation system stabilizers in multi-machine power systems which exhibit dynamic instability andpoor damping of several inter machine modes of oscillations. A new coordination synthesis methodusingasanEigenvaluesensitivityanalysisandlinearprogramminghasbeenaddressedforsimultaneous able to select the generators to which the PSS can be effectively applied andtosynthesize the adequate transfer functionof the PSSs for these generators. InAn Eigen valuesensitivity based analysis approach has been addressed for control coordination of series and shuntFACTScontrollersinamulti-machinepowersystemforseriesandshuntFACTScontrollersconsidered are SVC, TCSC and SVC-TCSC combination. An Eigen value sensitivity based analysisapproach has been addressed for design and coordinate multiple stabilizers in order to enhance theelectro-mechanical transient behavior of power systems. An Eigen-value sensitivity based analysisapproach has been addressed for the evaluation and interpretation of Eigen-value sensitivity, in thecontext of the analysis and control of oscillatory stability in multi-machine power systems. A modalanalysis reduction technique has been suggested. A frequency response technique has been used forcoordinated design of under-excitation limiters and power system stabilizers (PSS) in power systemfor enhance the electromechanical damping of power system oscillations. A root locus technique hasbeenproposedfordesignofpowersystemstabilizers(PSS)fordampingouttie-linepoweroscillations in power system to enhance the damping of power system oscillations for differentcombinationsofpowersystemstabilizersparameters.Aprojectivecontrolmethodhasbeenaddressedfor coordinated control of two FACTS devices such as TCSC and Thyristor Controlled Phase AngleRegulator (TCPAR) for damping inter-area oscillations to enhance the power transfers and dampingof power system oscillations. A problem of interest in the power industry is the mitigation of powersystem oscillations. These oscillations are related to the dynamics of system power transfer and oftenexhibit poor damping, with utilities increasing power exchange over a fixed network, the use of newand existing equipment in the transmission system for damping these oscillations is being consideredin several literatures. A non-linear technique has been proposed for robust nonlinear coordinatedexcitation and SVC control for power systems for enhance the transient stability of the powersystems. A new method has been proposed for the design of power system controllers aimed atdampingoutelectro-mechanicaloscillationsusedforappliedtothedesign ofbothPSSforsynchronous generators and supplementary signals associated to other damping sources. Voltagecollapseproblemsinpowersystemshavebeenapermanentconcernfortheindustry,asseveralmajorblackouts throughout the world have been directly associated to this phenomenon, e. g., Belgium1982,WSCCJuly1996,etc.Manyanalysis methodologieshavebeenproposedandarecurrently usedfor the study of this problem, as recently reported in several literatures These problems are solved inliterature, Lie et al. presented a linear optimal controller for the designed to implement multiplevariable series compensators in transmission networks of inter-connected power system is utilized todampinter-areaoscillationsandenhancepowersystemdamping.Thecoordinatedpowerflowcontrolshould address the following points such as elimination of interaction between FACTS controllers,ensuring system stability of the control process, security transmission system for both pre and postfault, and achieving optimal and economic power flow. A new method has been suggested for thepotentialapplicationofcoordinatedsecondaryvoltagecontrolbymultipleFACTSvoltagecontrollersin eliminating voltage violations in power system contingencies in order to achieve more efficientvoltage regulation in a power system. The coordinated secondary voltage control is assigned to theSVCsandStaticCompensators(STATCOM)inordertoeliminatevoltageviolationsinpowersystemcontingencies. Use of this power component as the dynamic variables reduces the degree of non-linearity of the VSC model in comparison with the conventional VSC model that uses d-q currentcomponentsasvariables.Furthermore,since waveformsofpowercomponentsareindependentof theselected q-d coordinates, the proposed control is more robust to the conventionally un-modeleddynamicssuchasdynamicoftheVSCphase lockedloopsystem.Anewmethodologyhasbeenproposed for decentralized optimal power flow control for overlapping area in power systems for theenhancementofthesystemsecurity.Thecontrollersconsideredforcoordinationarevoltageregulators, PSS, speed governors, main and auxiliary controllers of HVDC converters, and main andauxiliary controllers of SVC. A new methodology has been proposed for designing a coordinatedcontrollerforasynchronousgeneratore xcitationandSVCinpowersystemistoextendtheope rational margin of stability, whilst satisfying control requirements by introducing an integratedmulti-variable controller to control both the generator exciter and the firing angle of the thyristorcontrolledreactorofTCR-FCcompensators,anEigenvalueanalysistechnique isusedforcoordinated control of PSS and FACTS controllers to enhance damping of power system oscillationsin multi-machine power system. A sensitivity based analysis approach is used to find out an intercouplingbetweenavariationofsetpointsofdiffe rentFACTSdevicesandavolumeofloadsheddingwi th a variation of active power flow in transmission lines. A systematic procedure for the synthesisofaSupplementaryDampingController(S DC)forStaticVARCompensator(SVC)forawidera ngeofoperatingconditionsisusedfortestinginmulti-machinepowersystemstoenhancethedampingofth e inter-area oscillations, providing robust stability and good performance characteristics both infrequencydomainandtimedomain.YueandShlue teretal.presentedamultiplebifurcationphenomena for three kinds of µ -synthesis robust controls are designed such as µ -synthesis powersystem stabilizer (MPSS), µ -synthesis SVC control (MSVC), and a mixed MPSS/MSVC control. Abifurcationsubsystembasedmethodologyhasbee nproposedforµ-synthesispowersystemstabilizers design in a two-area power system. The secure operation of power systems requires theapplication of robust controllers, such as Power System Stabilizers (PSS), to provide sufficientdamping at all credible operating conditions. Recently, many researchers have investigated the use ofrobustcontroltechniquesincludingH-infinityoptimizationandµ-synthesistechniquesfordeveloping advanced and automated procedures for power system damping controller design. Aseveralcontroldesigntechniquessuchastheclassic alphasecompensationapproach,theµ–synthesis.A design method that explicitly considers both the coordination and the robustness issues has beenproposed for coordinated design of power system stabilizers and supplementary control of FACTSdevicestoenhancetherobustnessofthecontr olschemefordrasticchangesintheoperatingconditi on.This method is based on the formulation and solution of an augmented equation. A projective controlprinciplebasedonEigenvalueanalysishasbe enpresentedforcoordinatedcontroldesignofsupple mentary damping controller of HVDC and SVC in power system to enhance the damping ofpower systemoscillations.

**2) OptimizationBasedMethods:**

Thissectionreviewstheoptimalplacement ofFACTScontrollersbasedonvariousoptimizationt echniquessuchasalinearandquadraticprogrammin g,non-linearoptimizationprogramming,integerandmixed integer optimizationprogramming,anddynamicoptimizati onprogramming. A non-linear optimization programming techniques has been proposed for optimalnetworkplacementofSVCcontrollerandaB endersDecompositiontechniquehasbeenusedforth esesolutions. A mixed integer optimization programming algorithm has been proposed for allocation ofFACTScontrollersinpowersystemforsecurityen hancementagainstvoltagecollapseandcorrectiveco ntrols, where the control effects by the devices to be installed are evaluated together with the othercontrols such as load shedding in contingencies to compute an optimal VAR planning, a mixedinteger non-linear optimization programming algorithm is used for determine the type, optimalnumber,optimallocationoftheTCSCforloa dabilityandvoltagestabilityenhancementinderegul ated electricity markets. A mixed integer optimization programming algorithm has been usedfor optimal location of TCSC in a power system . Chang and Huang et al. showed that a hybridoptimizationprogrammingalgorithmforopti malplacementofSVCforvoltagestabilityreinforce ment.

**3) ArtificialIntelligenceBasedTechniques :**

This section reviews the optimal placement of FACTS controllers based on various ArtificialIntelligence based techniques such as a Genetic Algorithm (GA), Expert System (ES), ArtificialNeuralNetwork(ANN),TabuSearchOpti mization(TSO),AntColonyOptimization(ACO)al gorithm,SimulatedAnnealing(SA)approach,Parti cleSwarmOptimization(PSO)algorithmandFuzzy Logic based approach. A genetic algorithm has been addressed for optimal location of phaseshifters in the French network to reduce the flows in heavily loaded lines, resulting in an increasedloadability of the network and a reduced cost of production [48]. A genetic algorithm has beenaddressedforoptimallocationofmultipletypeF ACTScontrollersinapowersystem.Theoptimizatio n are performed on three parameters; the location of the devices, their types and theirvalues. The system loadability is applied as measure of power system performance. Four differentkinds of FACTS controllers are used as models for steady state studies: TCSC, TCPST, ThyristorControlledVoltageRegulator(TCVR)an dSVCinordertominimizingtheoverallsystemcost, whichcomprises of generation cost and investment cost of FACTS controllers [17]. A stochastic searchingalgorithm calledas genetic algorithm has beenproposed for optimal placement of static VARcompensator for enhancing voltage stability in [18]. Reference [19], genetic algorithm (GA) andparticle swarm optimization (PSO) has been proposed for optimal location and parameter setting ofUPFC for enhancing power system security under single contingencies. The VAR planning probleminvolves the determination of location and sizes of new compensators considering contingencies andvoltage collapse problems in a power system. The Genetic Algorithm (GA) and PSO techniques foroptimal location and parameter setting of TCSC to improve the power transfer capability, reduceactive power losses, improve stabilities of the power network, and decrease the cost of powerproduction and to fulfill the other control requirements by controlling the power flow in multi-machine power system network [27]. In [28], a Particle Swarm Optimization (PSO) technique hasbeenaddressedforoptimallocationofFACTSco ntrollerssuchasTCSC,SVC,andUPFCconsidering system loadability and cost of installation. The ACS methodology is coupled with aconventional distribution system load flow algorithm and adapted to solve the primary distributionsystem planning problem. A Graph Search Algorithm has been addressed for optimal placement offixed and switched capacitors on radial distribution systems to reduce power and energy losses,increases the available capacity of the feeders, and improves the feeder voltage profile [29]. In [30],the theory of the normal forms of algorithm has been addressed for the SVC allocation in multi-machine power system for power system voltage stability enhancement. Luna and Maldonado et al.has been addressed a new methodology is based on the evolutionary strategies algorithm known asEvolutionStrategies(ES)foroptimallylocatingF ACTScontrollersinapowersystemformaximizesth e system loadability while keeping the power system operating within appropriate security limits[31]. In [32], a knowledge and algorithm based approach is used to VAR planning in a transmissionsystem.TheVARplanningproblemin volvesthedeterminationoflocationandsizesofnewc ompensatorsconsideringcontingenciesandvoltage collapseproblemsinapowersystem.Applications of FACTS to power system stability in particular have been carried out using samedatabases. The results of this survey are shown in Figure 1, Figure 2 It was found that the ratio ofFACTS applications to the stability study with respect to other power system studies is more than60% in general. This reflects clearly the increasing interest to the different FACTS controllers aspotentialsolutionsforpowersystemstabilityenha ncementproblem.Itisalsoclearthattheinterestinthe 2nd generation of FACTS has been drastically increased while the interest in the 1st generationwas decreased. The potential of FACTS controllers to enhance power system stability has beendiscussed,whereacomprehensiveanalysisofd ampingofpowersystemelectromechanicaloscillati ons using FACTS was presented. The damping torque contributed by FACTS devices, whereseveralimportantpointshavebeenanalyzeda ndconfirmedthroughsimulations.

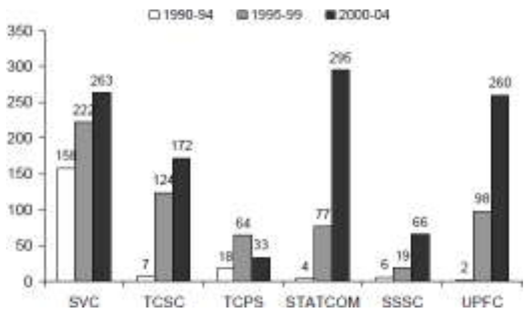


Fig1.StatisticsforFACTSapplicationstodifferentpow ersystemstudies

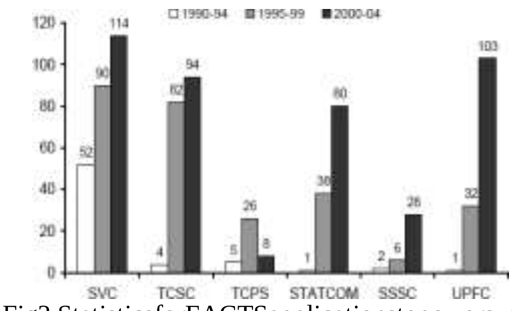


Fig2.StatisticsforFACTSapplicationstopowersyste mstability

## IV. NEURAL NETWORKS IN POWER SYSTEMS

SeveralpapersdealingwithANNapplicati onsinpowersystemsarebrieflydescribedinthesubse ctionsbelow.Theyhavebeengroupedwithrespectto thefollowingapplicationareas:Staticanddynamic security assessment, transient stability assessment, identification, modeling and prediction,control, load forecasting and fault diagnosis. This work, referenced by the most of the authors inANNs and power systems, dealt with the assessment of dynamic security. An adaptive patternrecognitionapproachbasedonafeedforward neuralnetwithabackpropagationlearningschemew asimplemented to synthesize the Critical Clearing Time (CCT). This parameter is one of paramountimportanceinthepost-faultdynamicanalysisofinterconnectedsystems.Th enetsuccessfullyperformed the estimation task for the variable system topology conditions. In [4]-1992, the sameauthors described the results of the investigation to "discover" relevant ANN training information.Simulations results showed how autonomous feature discovery was carried out in terms of directsystem measurements instead of pragmatic features based on the engineering understanding of theproblem. In this case unsupervised and supervised learning paradigms in tandem were used. Thestability boundary was constructed using tangent hyper surfaces. ANNs were used to determine theunknown coefficients of the hyper surfaces independently of operating conditions. Numerical resultsand comparisons between CCT analytically obtained and ANN-based indicated that this approachprovides quick assessment of power system security in [25]-1993, the authors (joined with Lee)presented a methodology applying ANN to carry out real-time stability analysis of power systems.Near-term transient stability of the system, mid-term and long-term dynamic security analysis wereperformed. The first one dealt with whether the system can return to steady-state, and the second onedealt with the manner of the final state is reached. They utilized the Kohonen Neural Net as classifierof power system states. The relation among the number of clusters, the number of neurons and thesizeofthepowersystemswereinvestigated.Simu lationresultsdemonstratedthesuccessfulgeneraliza tionpropertyoftheANN.Theimportantfeatureistha tcorrectassessmentwasobtainednotonly when the net was queried with an element of the training set of data, but also at other operatingconditions. The input stimulus for the net was contingency parameters such as transmission linestatus, machine excitations and generation level. Feed forward ANNs were used. Its effectiveness isdemonstratedthroughasteady-stateanalysisonasynchronousgenerator.Thisgener atorwasconnected to a large power system. As input to the net, real power, power factor and power systemstabilizerparameterswereused.Theoutputw asadiscretesignal:dynamicallystableorunstable.T heproposed ANN was compared with the multilayer feed forward with a back propagation-momentumlearningalgorithm.Itwasdeterminedth attheconvergenceoftheproposedANNwasmuchfa steranditsmisclassificationratewaslowerthanusing thebackpropagation-momentummethod.ItissaidthattheproposedANNi smoresuitablefordiscreteoutputvalues. TransientStabilityAssessment:Decision-makingsystems(DMS)basedonapreprocessor(par allel computationalstructure)andontwolayersofequival entneuronswereused.Theimportantdifferencebet ween DMS and multilayer ANN is that the DMS doesn't require a back propagation learning rulebutaperceptronconvergenceprocedure.

## V. RESULTS & DISCUSSIONS

ThecontrolcriterionoftheANNSVQCbala ncesthevoltageprofileofthepowersystem,whileatt hesame time diminishes the active and reactive power losses. To evaluate the influence of the proposedANN SVQC scheme we have focused on the power system operation economy and its security. TheANN SVQC-controlled power system voltage profile (labeled as ANN) was compared to that of thebasepowersystemoperatingstateinwhichthevol tagereferenceswerepresettoafixed value.Thesepowersystemstatesalsoaroseimmedia telyafterthedisturbanceandbeforetheANNSVQCr eacted.They have been labeled as base case. The two voltage profiles were in turn compared to the optimalvoltage profile, calculated with a help of the OPF. For this purpose, the following criteria wereselected: voltage profile of the entire EPS for a selected operating state and voltage histogram for thetest set and a selected node. In economical operation, the power system is supposed to have minimalactive and reactive power losses. In addition to voltage conditions, a histogram features ANN SVQCinduced improvement of active andreactive power losses withregards to the base cases beenproducedfor thetestset.

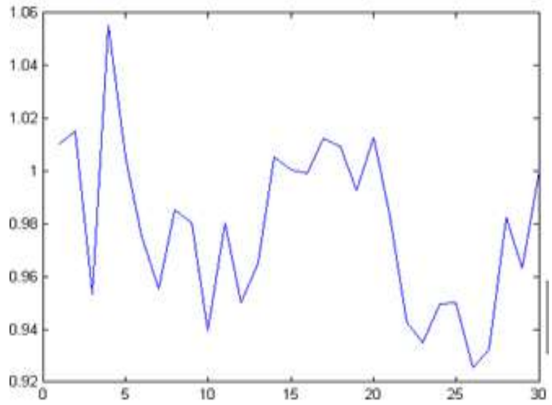


Fig3.Voltageprofilesinahealthysystemcase30basecases

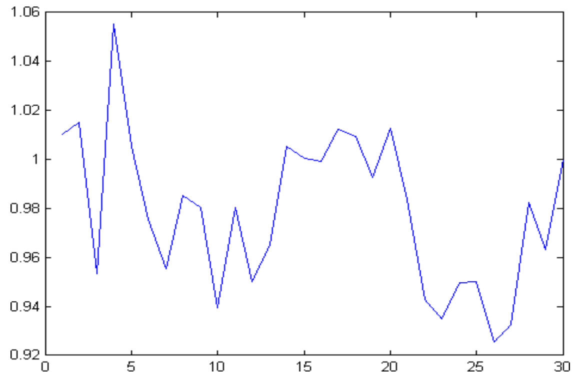


Fig4.Voltage profiles**ina**healthysystemcase30opf

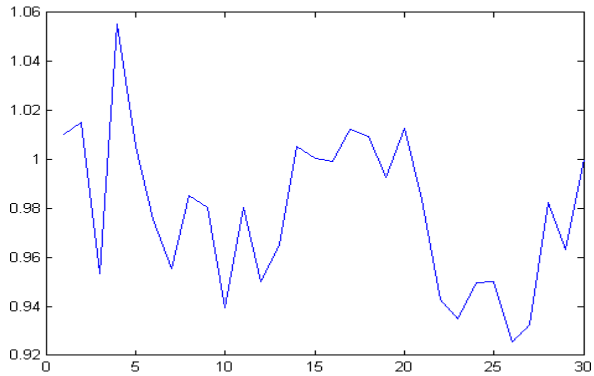


Fig5.Voltageprofilesina healthysystemcase30opfAnn

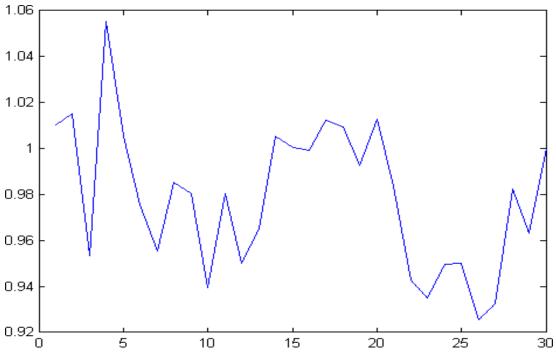

Fig6.Voltageprofilesina healthysystemcase 30opfANNOutage

ThestatisticalevaluationoftheANNSVQ C-sperformanceregardingactivepowerlossesmaybes eenin Fig. 3. It shows significant improvement over the base case, whereas frequency distribution of theANN results resembles the OPF distribution. A similar conclusion can be drawn for the ANNimprovement of reactive power losses when compared to OPF results in Fig. 4. A power systemvoltage profile presents voltage levels for all the nodes and for a selected operating state. On thefigures, the first ten data points depict generator nodes while the rest are load buses. On the otherhand,voltagehistogramsofferthefrequencyof certainvoltagesinaselectedpowersystembusforallt he operating states in the entire test set. In both cases, the comparison comprises base cases,operating states the ANN SVQC action and optimal solutions. Through combining both methods it ispossible to correlate the events in the power system and the ANN SVQC corrective actions, which inturn leads to security assessment. In Fig. 5, a comparison among base case, ANN and OPF voltageprofilescanbeobserved.TheANNvoltagesi nmostbusesconvergetoasub-optimalprofile,closetotheoptimalone.Inaddition,t heresponseoftheANNSVQCcontrolledpowersyst emtoanoutageofthe ANN controller in generator bus G5 is depicted. The comparison of the voltage profiles in lineL1516outageforaselectedoperatingstateissho wnonFig.6.AlthoughtheimprovementoftheANNc ontrolled profile over base case is not as significant as the one on Fig. 5, Fig 6, it is safe to concludethat the ANN SVQC is able to handle line outages adequately. The security of the ANN controlledpower systemisenhanced.

## VI. CONCLUSION

Inthisreview,thecurrentstatusofpowersys temstabilityenhancementusingFACTScontrollers wasdiscussed and scrutinized. The essential features of FACTS controllers and their potential to enhancesystem stability was addressed. The location and feedback signals used for design of FACTS-baseddamping controllers were discussed. The coordination problem among different control schemes wasalso considered. Performance comparison of different FACTS controllers has been reviewed. ThelikelyfuturedirectionofFACTStechnology,esp eciallyinrestructuredpowersystems,wasdiscussed as well. In the paper, a proposal of a decentralized secondary voltage control framework using ANNthatwasdevelopedforaSlovenianpowersyste misoutlined.InadditiontostandardSVQCobjective s,theproposedANNbasedschemeexertsalsofavora bleinfluenceonpowersystemoperation economy and security the voltage profile during normal operation without outages isgoverned.Sub-optimallyusingonlyANNSVQC.Atthesametime,t heoperationremainseconomical,astheactiveandre activepowerlossesaresub-optimalandcomparabletothoseobtainedviaOPFan dimprovedwhencomparedtobasecase**.**

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