ELECTRICAL ENGINEERING (ELE)

ELE 8001   Abellana, Arsenio A. (MS Elec. Eng'g.)
            An improved method for optimizing the benefits of
            capacitor application in radial feeders.
            1980.

The sizing, location and combination of capacitor banks to be placed in a radial distribution feeder for loss reduction and voltage control – is thoroughly investigated in this research work. The quantification of the benefits of voltage profile improvement and a thorough analysis for fixed and switched capacitor combinations are the main features of this work.

Solution algorithms together with the corresponding computer programs and derivations of the equations are presented here. A mathematical model of a single-ended radial feeder, with real reactive loadings assumed known at one hour intervals, was simulated in the IBM 360 UP Engineering Computer.

The results show that the consideration of monetary gain, due to voltage profile improvement of a radial feeder is a very important aspect in the allocation of capacitors. This gain is even comparable to the savings due to peak-loss and energy-loss reductions. Best results are obtained when a combination of fixed and switched capacitors are used and located at different points along the feeder.

ELE 8202   Lim, Nathaniel C. (MS Elec. Eng'g.)
            A   microprocessor-controlled   optical   character
            recognition system for use in the development of
            reading aids for the blind.
            1982.

        The objective of this research is to design an
operationally viable procedure for the development of a
microprocessor controlled system in order to enable the
blind to access ordinary printed materials available for the
sighted.   It would be possible to use recent advances in
microelectronics technology for such purpose.   Previous
solutions convert the printed characters bit pattern
directly to a tactile screen.   With this approach , the
blind will have to remember the small case and capital
letters as well as the numerals.   The present approach
investigates the plausibility of recognizing printed
characters by machine, thus, preparing the way for their
eventual transformation into a much more suitable display
for the blind.

        A solid state image sensor designed for optical
character recognition scans the printed character and its
image is electronically converted into a matrix of occupied
and unoccupied positions representing the character and its
surroundings respectively.   The digitized input image is
then processed into a succession of stages, which
successively preprocesses the character normalizes its size,
and partitions it into pertinent regions where the existence
of particular features (pattern primitives) are tested for.
The recognition after feature extraction is based on
exhaustive elimination by using a decision tree.

        The software was simulated at the SORD M223 MARK III
Z-80 based microcomputer.   To the extent to which the data
experimented on here are a realistic approximation of real
life characters, the success ratios shown here could also
apply to real life reading situations. As long as blemishes
in the character due to paper and printing imperfections do
not deform the figure too much, the recognition scheme seems
to work well even under minor deviations in character shapes
or even under localized noise.

ELE 8203   Santos, Rizalino G. (MS Elec. Eng'g.)
             An improved economic dispatch procedure for electric
             power systems.
             1982.

        An improve procedure for solving the economic dispatch
problem in electric power systems is presented. The
proposed method solves the coordination equations using
penalty factors derived from a fast-decoupled loadflow
routine. It takes into account constraints on system
variables which are beyond the scope of traditional loss-
formula procedures. With this procedure, the network
configuration and loading.
        The method is tested using standard five-bus and
eleven-bus systems. The results are compared with those
obtained using other accepted methods.

ELE 8204   Wesnarat, Narong (MS Elec. Eng'g.)
             An implementation of a public-key cryptosystem with
             digital signatures on a microcomputer.
             1982.

        Modern electronic communication systems present many
problems in data security. One way of solving these
problems is to resort to cryptographic systems.
        Public key cryptography with digital signatures is a
new approach in cryptography which offers many advantages
over conventional cryptographic systems. The concept was
introduced in 1976 and some practical systems were proposed
about a year later. The most elegant system which yields
digital signatures directly was proposed in 1978 by R.L.
Rivest, A. Shamir and L. Adleman. This system is known as
the RSA Public Cryptosystem.
        To study the feasibility of implementing the RSA
public-key cryptosystem in a microcomputer-based
communication system, a microcomputer using Z80-A
microprocessor was designed and built. An operating system
for the RSA public-key cryptosystem was written and
evaluated.

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The result of the study is a complete working microcomputer system capable of editing the message, generating public-key cryptographic keys, encrypting and decrypting using the RSA public-key scheme. It is also able to transmit, receive and record plaintext or ciphertext using standard serial I/O interface signals.

As by-products of the software development, assembly language programs to compute some useful integer arithmetic functions at very high precision were developed. These functions are: greatest common divisor, Jacobi symbol, modular exponentiation, prime number generation, pseudorandom number generation, signed-multiplication, signed-division and signed-subtraction. All these functions have accuracy up to 154 decimal digits.

ELE 8305   De Castro, Arnulfo D. (MS Elec. Eng'g.)
             Load forecasting for electric power distribution
             systems.
             1983.

The success of distribution expansion planning depends to a great extent on the accuracy of small-area forecasts. However, available extrapolation techniques such as curve fitting and curve shape clustering sometimes do not provide sufficient accuracy while simulation methods based on land use entail considerable expenses and large computer memory requirements.

In this thesis, a method of improving the accuracy of trend forecasts, previously employed with curve fitting, is extended to forecasts developed through clustering. This method, called vacant area inference (VAI), involves adjustment of the initial forecasts in accordance with the more reliable system-wide forecast and using estimates of horizon year load levels.

The method was tested using a rectangular portion of Metropolitan Manila. The program was implemented on a microcomputer, making it a very attractive option for small utilities' as well.

The results of the study show the effectiveness of the approach, not only in adjusting forecasts of small areas with load history, but also for predicting loads of previously vacant areas.

ELE 8406   Sadain, Said K. Jr. (MS Elec. Eng'g.)
            A computer-based optimal distribution substation and
            primary feedep planning.
            1984.

        A fixed charge Generalized Network Problem (FCGNP) for
solving the electric distribution system planning problem is
formulated. The model is unique in that it introduces loss
constraints in addition to the traditional considerations
for fixed charges, variable costs, capacity limits and the
conservation of power flow.
        A branch-and-bound procedure using the generalized
network model as fathoming device is coded into a computer
software program to solve the problem of optimal
distribution substation siting and sizing, and primary
feeder routing.   The branch-and-bound procedure adapts a
dominance criterion, a priority scheme and validity tests
due to a fixed cost upper bound and source sufficiency, to
improve its computational efficiency.
        Results of program implementation on test systems are
reported and compared with those obtained from the use of
the traditional pure network flow problem formulation.
Experience with the program indicates that the proposed
model is feasible (in terms of computing time) and superior
than the pure network flow model (in terms of quality of the
solution network).

ELE 8507   Dee, Daniel (MS Elec. Eng'g.)
            An engineering word processor on a small computer
            system.
            1985.

        The goal of this thesis is to design and construct an
engineering word processor and show that this is possible to
implement on a small computer system. A small computer
system is defined and the specification of an engineering
word processing system is given. The various problems
involved in the implementation of the system are discussed.
It concludes with an evaluation of the word processing
system and suggestions for its extension are given.

ELE 8608   Alcasid, Danilo A. (MS Elec. Eng'g)
            Hardware and software implementation of a binary
            decision tree and algorithm.
            1986.

        It was shown that the use of a binary decision tree
can speed up the execution time as well as reduce the memory
programming requirements of boolean functions. The Binary
Decision Based Controllers that was constructed for this
project performed well although additional refinements can
still be added. The controller can easily perform simple
decision jobs, but it may require additional hardware, like
external latches for more complicated jobs, like a sequence.
        With the ever increasing speed of microcomputers
coming out of the market, it may not be advisable to
construct a BD machine where a microcomputer can easily take
over. The program to generate the binary decision tree and
algorithm, however, will still be of great use to reduce
execution time and length of program. A different assembler
has to be made for each microprocessor.
        The program to convert the binary decision tree into a
binary decision algorithm can still be greatly improved to
further reduce the subminimal binary decision algorithm.
Just like any algorithm, this may require an exhaustive
search, in order to generate the optimum decision algorithm.

ELE 8609   Ramirez, Rafael S. (MS Elec. Eng'g.)
            Computer aided logic synthesis of programmable logic
            arrays.
            1986.

        This thesis has presented a model of PLA Synthesis
that identifies it, in general, as a constrained
optimization problem. Without optimally constraints
applied, this reduces to a constrained allocation problem.
        A systems approach was used that identified the
constraints and cost functions relevant to synthesis of a
digital machine's combinational portion into PLAs in a

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concise and accurate mathematical manner. The automation of PLA Synthesis local area processes into workable computer algorithms was developed and presented. These were integrated into a working prototype CALS-PLA/PAL tool. The realization of this tool and its processes to the general CAD for any digital system was also identified.

ELE 8710   Chen, Jingke (MS Elec. Eng'g.)
            An improved algorithm for digital impedance relays:
            simulation and experiment.
            1987.

This thesis presents an improved algorithm for digital impedance relays of long-transmission-lines. The algorithm has a higher ability to process transient signals and needs a narrower data window compared to other algorithm.

For the first step, the analytical method of solving for the electromagnetic transients on a distributed transmission system is introduced. This is a key step because it reveals the natural characteristic of transient signals on a distributed systems and its results enable us to develop an improved algorithm.

Secondly, as an application, the natural characteristic of transient signals is used as a basis for the Least-Squares approach to create an improved algorithm. The algorithm for the impedance relay is simply like a FIR digital filter, but the differences are that it is designed especially for processing transient signals and by a time domain approach design method. As a result, the algorithm for the digital impedance relay does not need any filter to pre-process input signals. The Nuquist Sampling Theory is easily satisfied when a new definition named time-variance spectrum as introduced into spectrum analysis.

Thirdly, the system simulation is adopted for checking the improved algorithm by applying it to a distributed transmission system and comparing it with the unimproved one.

Lastly, the algorithm is realized on a Z80 microprocessor and the dynamic tests are completed on a transmission line model.

ELE 8711   Echevarria, Antonio N.,Jr. (MS Elec. Eng'g.)
            Signal sampling and storage applications in digital
            systems maintenance.
            1987.

        The oscilloscope, as a major tool in maintaining
digital equipment, fails to provide stable, useful displays
when monitoring unrepetitive, or single-shot digital
sequences. A microprocessor-based, 8-data-channel device
for sampling and storing these digital signals,
synchronously or otherwise, at different sampling rates is
proposed and implemented as a solution to this maintenance
problem.

ELE 8712   Nuqui, Reynaldo F. (MS Elec. Eng'g.)
            Optimal generator maintenance outage scheduling using
            integer programming.
            1987.

        An improved generator maintenance scheduling procedure
for electric power system is formulated. The model
deviates from the traditional methods of solution but
retains their computational efficiency.
        The maintenance scheduling problem is formulated as a
0 - 1 linear integer program. An enhanced version of the
rigorous 0 - implicit enumeration algorithm is coded into a
computer software to determine the optimum outage schedules
of generating units.
        The objective criterion is not limited to "levellizing
reserve." The model is flexible in that it accepts a wide
variety of useful criteria such as; (1) earliest possible
schedule; (2) minimum changes from existing schedule; (3)
least maintenance cost schedule.
        The model is tested using sample systems and the
National Power Corporation's (NAPOCOR) Luzon Grid generating
system. Using various classes of objective criteria,
results are compared with other accepted methods.
Experiences with the program indicates that the model is
comparable (in terms of computing time) and superior (in
terms of quality if optimal solution (s)) than the heuristic
methods.

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ELE 8813   Compendio, Rex D. (MS Elec. Eng'g.)
            A power system study of NAPOCOR's proposed Leyte-Samar
            power grids interconnection.
            1988.

        A   complete   power   system   study   on   the   proposed
interconnection of the NAPOCOR's Leyte and Samar Power Grids
that   includes   the   formulation   of   the   grid's   economic
generation   schedule   is   the   subject   of   this   report.   A
microcomputer based computer   program computes the   most
economic   generation   schedule   when   all   LGPP-I units   are
available   and   another   program   when   only   two   units   are
available.   In   both   cases,   the   dispatching   of   the   PB-I
generators would only be when the grid's minimum spinning
reserve could no longer be attained.

        Load flow solutions pinpoints areas that experience a
low voltage problem specially during peak load hours but
there is no over voltage problem in any part of the system
even after a load rejection.   The low voltage problem is
solved bu changing the tap settings of the transformers
supplying the effected areas.

        Protective Relays settings are computed based   on the
results of the fault analysis that gives the fault levels of
all   the buses.

        The cause of PASAR's continuous load fluctuation and
the   consequent   fluctuation   of   the   systems   voltage   and
frequency originates from the commercial rectifier which has
an inherent 21 second cyclic operating characteristics.   The
commercial rectifier will be in forward direction drawing a
31 kiloampere constant current from the system for 20
seconds and will be reversed in the next 1 second.   The
effect of the PASAR load fluctuation to the   system
stability is negligible and the elimination of the same is
not economically possible.   The system is stable for other
system   disturbances   such   as   three   phase   faults,   load
rejection, motor starting and generator or plant tripping.

        The load   shedding set up of the grid is reliable
enough   that in all cases   simulated, appropriate   feeders
are shed following the tripping of one or more generators in
the system.

ELE 8814   Lim, Rudy Alkuino (MS Elec. Eng'g.)
             A study of Direct-Sequence Spread Spectrum/ Delta
             Modulation System.
             1988.

        This study focuses on the design, construction,
practical and theoretical performance evaluation of Direct-
Sequence Spread Spectrum/ Delta Modulation System.
        The prototype model of the system is a Direct-Sequence
Spread Spectrum system intended for digital communication
over wire transmission channel using baseband modulation,
specifically Continuously Variable Slope Delta Modulation at
16 kbps. The coding used was a maximal-length Gold Code and
a test tone of 1 KHZ frequency was used as the input signal
in order to determine the performance of the system.
        The Signal-to-Quantization Noise ratio of the CVSD
(Continuously Variable Slope Delta Modulator) used was
determined both through mathematical calculations and test
measurements.
        The BER of the system was determined theoretically
and it is computed with pulse-noise jamming signal
introduced in the transmission channel to demonstrate the
advantage of spreading the bandwidth of data before
transmission.
        The circuit design of the system was made to make use,
as much as possible the available electronic components in
the local markets, except for the Adaptive Delta
Modulator/Demodulator, used for general communications which
had to be imported from Hongkong.

ELE 8815   Naval, Prospero C. Jr., (MS Elec. Eng'g)
             Design of microcomputer-based x-ray diffractometer
             controller.
             1988.

        This work describes the design of an APPLE II-based x-
ray diffractometer controller capable of acquiring and
analyzing x-ray powder diffraction data. The controller's
interupt-driven hardware includes an on-board scaler for
counting x-ray pulses, a closed-loop stepper motor driver

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for philips PW1050 Vertical Goniometer, and circuits for preset count data collection and safety.

ACQUIRE- a data acquisition program for the controller, coordinates its various devices so that it can perform sample scanning in any of the following modes: continuous, preset time or preset count scanning. This program watches over the scanning process and will try to correct any error it detects. Any fault monitored is logged on disk. the collected diffraction data is stored on disk together with its data acquisition parameters and may be transported to another computer.

Data analysis is done by ANALYZE, a program that operates on the output file generated by ACQUIRE. Its 15 single-keystroke commands permit panning and zooming of the sample's diffractogram, data smoothing, data peak report generation, and digital plotting. Data smoothing uses a 3rd-degree Savitzky-Golay Convoluting Filter of user-defined width. For peak detection the peak search algorithm examines the diffractogam's 2nd derivative for any Gaussian resemblance and checks the peaks' area for statistical significance. The hard copy plot is available from any on line digital plotter supporting EPSON's Mode 0 Plotter Commands.

ELE 8816   Nerves, Allan C. (MS Elec. Eng'g)
            A solution to the economic dispatch problem for AC-DC
            systems.
            1988.

A method is presented for solving the economic dispatch problem for AC-DC systems. Equations are formulated to derive penalty factors for these systems. The solution utilizes a simultaneous-method Newton-Raphson load flow within its overall procedure. A direct exact calculation of the penalty factors from the Jacobian of the converged load flow is proposed. These penalty factors are used to satisfy the incremental cost criterion for economic dispatching. Tests and results are given for a hypothetical system.

ELE 9117   Abelanes, Ma. Teresa R. (MS Elec. Eng'g.)
            Performances evaluation of ATM networks-single and
            shared.
            1991.

        The study presents basic ideas regarding banking ATM
networks.   These include a discussion of the line control
procedure and protocol used, security measures adopted in
ATM networks and reliability of the network.   The response
time of the ATM network of one of the local commercial banks
was also determined.

        Security is one of the main concerns in ATM networks.
The shared ATM network, aside from the measures used by the
individual ATM networks, utilizes message shuffling to
protect the data being transmitted from the host of a single
network to the switching computer.

        Reliability of ATM networks is a very important
measure of its performance.   The ATM network is a series
system.   The reliability of a single ATM network is
estimated to be 98.8%.   For the shared ATM network, since it
consists of more components, the system reliability
decreases to 97.04%.

        The system's response time, which is the one of the
most important design considerations in computer networks,
was determined by analytical means and by simulation.   The
results obtained by such methods were verified by obtaining
actual response time measurements on the existing ATM
networks.   For the individual ATM network, these three
methods yielded results which were approximately the same.
However, the same could not be said for the shared ATM
network.   The analytical method yields a response time of
4.895 seconds while the simulation results in a response
time of 6.27 seconds.   The analytical means of determining
the response time may not be accurate in certain conditions
such as large number of transactions and large number of
ATMs.   For this reason, the simulation method is said to be
a better method of determining the system's response time.

ELE 9118   del Mundo, Rowaldo R. (MS Elec. Eng'g)
            Development of models and methodologies for optimizing
            electric power system reliability.
            1991.

            The importance of optimizing the level of reliability
    of electric power system cannot be over-emphasized.
    Consumers of electricity suffer inconvenience and economic
    losses flor every power interruption. The electric utility,
    on the other hand, is constrained by several economic
    factors to meet the high reliability requirements of
    customers. And like any product in the market, the higher
    the reliability is, the more costly the power supply will
    be.
            To quantify the losses to consumers and to determine
    the optimal level of reliability of power system, analytical
    models and methodologies were developed in this study.
    Practical studies were conducted in order to apply and
    validate the models and techniques developed.
            A survey of power outages in the industrial sector of
    Metro Manila was conducted. Optimal level of reliability
    was determined for NPC Luzon Grid using a computer program
    developed by the author for the study.

ELE 9119   Pimentel, Aurelio C. (MS Elec. Eng'g)
            A computerized student advising system.
            1991.

            The design and implementation of a computer program
    for advising the students during registration periods in the
    Electrical Engineering Department of the College of
    Engineering of the University of the Philippines is
    discussed and presented.