Research projects are funded through an agreement with the Kansas Corporation Commission (KCC), the state electric utility regulatory body, which allows the KEURP member utilities to retain a portion of their Electric Power Research Institute (EPRI) dues for in-state electric utility research projects. In 1986, 35 research proposals were received and reviewed, 14 proposals were approved and funded.

The mission and objectives of KEURP are basically to support applied research, development, and demonstration projects related to those aspects of the electric utility which are generally unique to Kansas. State universities in Kansas are given priority to conduct or participate in KEURP projects.

From an organizational standpoint, KEURP is made up of two committees and a program director. An Executive Committee (EC) is responsible for the general overall operation of the program. All research projects must be given final approval by the EC before they are funded. A technical Committee (TC) conducts much of the regular KEURP business. The TC develops new projects, writes RFP's, evaluates proposals received, approves new projects (subject to final approval by the EC), and monitors the progress of ongoing research projects. The Program Director (PD) is responsible for the general day to day operation of the program and coordinates the activities of the EC and TC.

Recent projects funded by KEURP have included, among others, the development of a system for the calibration of coupling capacitor voltage transformers (CCVT's), a study of harmonics in Kansas electric utility systems, field tests of load and facilities management devices, and a study of transmission line right-of-way vegetation control. Many of these projects were conducted by researchers at state universities in Kansas. Some projects have also been co-funded by EPRI and other agencies.

From a university standpoint, KEURP has given university faculty the opportunity to conduct funded research in the electric power field. It has also produced a greater degree of cooperation between state electric utilities and universities.

From an electric utility standpoint, KEURP has fostered greater cooperation between utility personnel and university faculty. In addition, KEURP research projects at local universities have given both graduate and undergraduate students an exposure to the electric utility industry. Also, by pooling their resources into KEURP, the Kansas electric utilities have been able to conduct some large scale research projects.

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Evaluation of Power Flow Techniques for Personal Computers

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Power flow studies have usually been conducted on large mainframe computers or on minicomputers with large storage capacities. As the computer technology rapidly developed, changes in the computing environment have also taken place. One such change is the use of the personal computers (PC) to run power flows for various studies. Most of the research up to date were aimed to reduce the computation time and memory requirements. Accomplishing these goals enable the users to develop and run power flow programs that could not only be executed on personal computers but at the same time yield fast, accurate results for considerably large size power systems.

In this paper comparative evaluations of various power flow solution algorithms implemented in an IBM AT personal computer are presented. Four different algorithms namely Fast Decouled Load Flow (FDLF), Gauss-Seidel (GS), Newton-Raphson (NR) and Second Order Load Flow (SOLF) are implemented and case studies are carried out for 5, 14, 30, 57 and 118 bus test power systems. The data gathered via simulations are analyzed with regard to the run times, convergence patterns, initial conditions, employed arithmetic precision and ill-conditioning of the system equations.

The well known properties of these algorithms are confirmed by the case study results. The NR method is reliable and rapid in convergence, whereas the GS is slower and may even fail to converge under severe ill-conditioning. Experimenting with the algorithms indicated that favorable starting values for other algorithms could be obtained by initially running n GS iterations, where n is the system size. This resulted in convergence speed-ups for the NR and SOLF algorithms. In general the SOLF algorithm seemed to take the least number of iterations to converge due to the corrections accounting for the second order terms at each iteration. Also, the overall computation load for P^{cal}, Q^{cal} calculations is reduced via the recursive formulations employed as described in the paper.

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