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LANL Proposal 4086H0015-37

Cerros Proposal LA94-X-101

Technical Proposal

by

Cerros Systems

Albuquerque, NM

**Scientific and Engineering Services for the LANCE/ER
Accelerator Production of Tritium (APT) Project**

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December 5, 1994

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Scientific and Engineering Services for the LANCE/ER Accelerator Production of Tritium (APT) Project

1. Project Objective

The objective of this support effort is to provide Los Alamos APT project staff with specialized scientific and engineering services in the following areas:

- * technology demonstration plan
- * project business plan,
- * record of decision (ROD), and
- * systems performance and decision analysis.

This work will be performed principally at the APT offices in Los Alamos, New Mexico.

2. Introduction

The APT project office is conducting a preconceptual (Title 1) design study for an accelerator driven concept to produce tritium. The facility will require new technology in many areas, since the scale of this accelerator is significantly larger than any in operation to date. The facility is composed of four subsystems: accelerator, target & blanket, balance of plant, and tritium purification system (TPS). New physics realms will be entered in order for the concept to be feasible; for example, extremely high energy levels of the entering protons that induce (multiplicative) spallation of the neutrons from the high Z target will occur. These are complex and require advance codes (MCNP) to predict the physics interactions and as well as deleterious material effects in the surrounding structures. Other issues include component cooling and complex thermal-hydraulics effects within the blanket and the beam "window." In order to support a DOE mandated fast ROD schedule, Los Alamos APT staff will be provided with senior, engineering technical support staff with direct APT technology experience and whom are "on site".

3. Principal Investigator

The proposed principal investigator is Mr. Louis Guillebaud. He has over 20 years experience with systems engineering including the planning of technical and business programs, reliability and safety evaluations, and overall project leadership of customer support tasks. Mr. Guillebaud has been previously support the Los Alamos APT project with similar efforts since 1992. He has directly contributed to Lab APT efforts with project planning, design optimization, performance assessments, reliability-availability-maintainability (RAM), schedule development and interacted with industry contacts. Mr. Guillebaud will be stationed at the Lab APT project office and provide direct contact between Cerros Systems and Dr. Lisowski. All technical efforts will be

coordinated with Dr. Lisowski; and Mr. Guillebaud will be responsible for the assignment of any internal Cerros work assignments within the scope of the present effort. Mr. Guillebaud is a *key staff* personnel for this project and will not be reassigned without Lab authorization. This ensures a firm commitment by Cerros to the APT project and ensure that proper technical support services can be provided to the Laboratory.

4. Technical Approach

Cerros will provide the following technical support services under the direction of Mr. Guillebaud:

Development and implementation of a technology demonstration plan: Cerros staff will work closely with LANL staff members to address key issues impacting technology demonstration. An overall "success path" model will be developed focusing on the technical risk and critical importance of the elements comprising the APT concept. Input will be received from Lab sources as well as incorporating both domestic and international experiences with accelerator-driven systems. This information will be integrated into a "living" computer model of the overall concept.

Development and implementation of the APT project business plan: Cerros staff will work with APT management to construct an overall business plan for their review and finalization. This will consider the project objectives, DOE headquarters requirements, funding and the "national team" input. Project business plan will be a "living model" that can easily be updated and modified as programmatic redirection is encountered.

Record of Decision (ROD) Preparation: Cerros staff will assist with the preparation of all technical information, documentation, briefing material and other needs to assist with the ROD process. All requirements provided under the CFR will be considered, including those of Title I and II.

Systems and Decision Analysis: Cerros staff will provide all expertise necessary to conduct assigned APT systems analyses, component assessments and high-level decision analysis. This effort will build from computer models developed by Mr. Guillebaud using the "integrated systems performance assessment" (ISPA) approach. Continued effort will be made to refine the RAM model including integration with new components and/or system descriptions. This will allow a comprehensive, integrated, quantitative assessment of all APT component functions and produce a 'top level' decision analysis tool for project staff. Such a model will ensure the final design is fully compliant with all high level requirements placed upon the APT concept including: production goals, reliability, etc. This will allow a definitive quantification of all "WHAT IF" questions and demonstrate overall acceptance of the concept.

Component level assessments will address key phenomenological aspects of fluid, heat transfer and neutronic behavior. This will employ state of the art tools, such as computational fluid dynamics packages (FLOW-3D) and lab developed codes (e.g., TRAC, MCNP). HAZOP assessments will be completed based upon statutory requirements of all cognizant governmental and

laboratory regulatory practices. This will use recognized experts in the field to ensure the application of acceptable methodologies.

5. Deliverables

Monthly Progress Reports : These reports will provide highlights of technical accomplishments and identify any issues needing addressing. Trip reports will also be included. These reports will be available to APT management by the third work day of the following month with copies being provided to Lab contract personnel and Cerros management.

RESUMES

Personnel

Labor Category

Mr. Louis Guillebaud*
(Key Staff)

Senior Engineer I

Ms. Lori Williams*

Computer Scientist II

Mr. Ray Sartor

Engineer II

Mr. Dale Snider

Engineer II

Mr. Yoram Yadlin

Computer Scientist II

* Cerros Systems employee. Others are part time or consultants and will be used only after permission from the contracting officer.

LOUIS J. GUILLEBAUD

WORK SUMMARY

Mr. Guillebaud has 20 years of experience with advanced power technology projects both in the industrial sector and in research laboratories; primarily project management; systems integration; decision analysis; safety analyses and risk assessments; inspections; operational support; and licensing. This experience is based on a strong background in nuclear physics and engineering, systems design, analysis and integration and management and planning of R&D programs. Mr. Guillebaud's project management experience includes design, construction and operation phases. In addition to technical group management, Mr. Guillebaud experience also includes marketing of technical products and services ;proposal generation; contract negotiations; cost and scheduling; task planning and organization; on-site client assistance both in the US and abroad.

PROFESSIONAL EXPERIENCE

Ray Rashkin and Associates (RRA) Oct. 1994 to present

Mr. Guillebaud works as a senior staff (through RRA) in the LANL APT (Accelerator Production of Tritium) project office. His responsibilities include the following:

- Systems and project integration; business plan development; system performance assessment; design optimization with RAM methods; organization and management of technical interfaces through five technical working groups; cost and scheduling; planning of long-range technology development program activities;

Science Applications International Corporation (SAIC) July 1990 to Oct. 1994

Mr. Guillebaud was a Project Manager with the Risk Reliability and Safety Technology Division in SAIC's Albuquerque, New Mexico office. Mr. Guillebaud was responsible for the following :

- Project management and technical assistance to Los Alamos National Laboratory for the development of an advanced accelerator-driven facility; systems and project integration; integrated performance assessment; design optimization with RAM methods; organization and management of technical interfaces through five technical working groups; cost and scheduling; planning of long-range technology development program activities.
- As part of an electric utility preparation for a safety system functional inspection by the US. Nuclear regulatory Commission (NRC), Mr. Guillebaud conducted a comprehensive functional inspection of key safety systems at the Florida Power Corporation's Crystal River Plant (1000-MWe PWR). This inspection covered plant design modifications; systems engineering; operations and maintenance procedures; interviews with plant management, technical staff, and operators; operator training; procurement of spare parts; and quality assurance.
- Mr. Guillebaud managed the Wisconsin Public Service Company Individual Plant Examination for External Events (IPEEE) project for a seismic upgrade of the plant which included development and implementation of a functional assessment methodology of the

plant electrical systems.

- Mr. Guillebaud was Deputy Project Manager for the Grand Gulf Power Station Individual Plant Examination (IPE) Project. Specific responsibilities associated with this position included on-site client assistance for the development of front-line and support system fault tree analyses, accident sequence analysis, development of the model top logic, guidance and assistance in sequence quantification, and technical project management (6 engineers). Mr. Guillebaud personally coordinated the development and review of all the plant system analyses necessary to the risk assessment of this particular facility. In addition, Mr. Guillebaud has provided extensive on-site assistance to Entergy Operations, Inc to enable the IPE model to be used as a risk management tool for the conduct of plant operations.

Mr. Guillebaud was a key participant in the following projects:

- BWR-6 River Bend Anticipated Transient Without Scram (ATWS) reactor protection system analysis.
- Savannah River K-Reactor: Safety analysis primary and secondary cooling systems.
- Rocky Flats Building 707 Final Safety Analysis Report Review.
- BWR-4 Cooper IPE: On-site direct assistance for the linked systems quantification, system review, and ATWS analysis.

Centerior Energy, January 1987 to June 1990

Mr. Guillebaud's responsibilities as Lead engineer in the Systems Analysis Group of the Engineering Department included the analysis and development of several plant system models. Mr. Guillebaud analyzed, developed, and updated these risk models to enable the plant to prioritize its engineering upgrade programs and maintenance activities. In the process of establishing the risk model Mr. Guillebaud performed a comprehensive review of the conduct of operations for this facility.

Prior to his involvement in the IPE risk model development, Mr. Guillebaud was in charge of the Performance Engineering Department's Operational Analysis Group, which reviewed and analyzed operational events, including Licensee Event Reports. The results of this program were incorporated in plant operations, design, maintenance, and training. Mr. Guillebaud initiated the Reliability Centered Maintenance Program and supported the activities of the maintenance department. He supervised seven engineers and contractors.

ESCOM (Electricity Supply Commission), June 1980 to December 1986

Mr. Guillebaud worked as the Consulting Project Engineer responsible for resolving seismic design issues for the Koeberg Nuclear Power Station (KNPS), which is the first nuclear plant in the world constructed on an aseismic-bearing structure. Both vertically incident propagating earthquakes (SSE at 0.3 g and DSE at 0.36 g) and horizontally propagating earthquakes were considered in the design of KNPS. A seismic margin approach was used to verify the seismic ruggedness of plant systems and equipment. The seismic ruggedness of selected safety systems piping and equipment was determined either with the modal-spectral or static equivalent methods and followed ASME III code design rules. Fragility shake table tests were conducted for electrical switch gear, control and instrumentation (C&I) equipment, and emergency diesel generator auxiliary equipment.

Mr. Guillebaud was the principal author of the seismic submittal that provided the seismic analysis of selected safety systems, support and ventilation systems, above-ground safety-related tanks, and electrical and C&I equipment.

Mr. Guillebaud developed course material on the seismic design of equipment, piping systems, and supporting structures and taught this material to ESCOM design engineering and plant technical support groups.

Mr. Guillebaud was Consultant to the Chief Engineer of the Nuclear Safety Group. He prepared safety analyses that were based on the NSSS Vendor Design Basis Studies and a Level 3 PRA, both of which were used for licensing KNPS. The Level 3 PRA was originally prepared by the French NSSS supplier and included shutdown initiators such as those of the Loss of Residual Heat Removal System, fuel handling accidents, spent fuel pool accidents, and radwaste gas tank accidents, in addition to initiating events during power operation. His role was to perform deterministic and probabilistic analyses to support the continued operation of the plant, to satisfy regulatory requirements, and to justify technical specification changes. All of the above activities required a comprehensive review and understanding of the Koeberg operating procedures for both normal and abnormal operations.

General Atomic, Advanced Converters Division, September 1977 to June 1980

As a Senior Nuclear Engineer in the HTGR Department, Mr. Guillebaud was responsible for implementation and analysis of a full-scale experimental core flow test program and development and numerical simulation of additional tests to understand finer-scale flow interactions. He developed several large computer flow network models to reproduce test results for different core conditions and geometries (i.e., modeling of graphite permeability effect in new core regions and cross flow modeling in irradiated regions). The results of these experiments were used for core thermal-hydraulics design. These experiments were conducted at the Saclay laboratories, France where Mr. Guillebaud was assigned as the General Atomics representative test engineer..

Mr. Guillebaud designed a separate air test rig and a series of flow tests to study the cross flow distribution between adjacent core regions, and simulated these experiments with additional large flow network models.

Babcock & Wilcox Company, September 1976 to September 1977

Mr. Guillebaud was a staff member of the Thermal-Hydraulics Group of the Fuel Engineering Division. He jointly developed a computer code to statistically predict the densification of uranium dioxide fuel elements in nuclear reactor cores. This work was based on out-of-core resintering test results designed to simulate the core thermal conditions. He was involved in the design and follow-up of the resintering experiments with the fuel manufacturing plant. He also participated in the design optimization study of Mark C (17 x 17) fuel bundles.

Massachusetts Institute of Technology, September 1974 to September 1976

As a graduate student, Mr. Guillebaud was a teaching assistant in a fuel management course and a research assistant in thermal-hydraulics projects sponsored by the Electric Power Research Institute (EPRI) and Northeast Utilities. Mr. Guillebaud participated in the development of the EPRI COBRA III-C/MEKIN thermal-hydraulics code package. Mr. Guillebaud's nuclear engineering thesis work consisted of developing a thermal-hydraulics code package to predict vapor diffusion in BWR fuel rod bundles.

EDUCATION

N. E. D: Nuclear Engineer's Degree Massachusetts Institute of Technology (1976)
M.Sc.: Nuclear Engineering, Massachusetts Institute of Technology (1975)
Diploma: Technology/Computer Sciences, Université II, USTL, France (1973)
Diploma: Sciences, Math/Physics, Université II, USTL, France (1972)

AWARDS, HONORS, AND PROFESSIONAL AFFILIATIONS

- Registered Professional Engineer, Ohio
- Registered Professional Engineer (Mechanical), New Mexico

PUBLICATIONS AND PRESENTATIONS

LA-CP-94-28 (March 1994): Co-author of the APT Cost and Schedule Report (LANL Proprietary)

LA-CP-94-26-Rev. 1 (March 1994): Co-Author of the APT Balance of Plant Topical Report.

LANL Proprietary: APT Technology Development Program Four Year Plan (FY95 through FY98)

SAIC IPEEE Marketing Program: Presentation of the seismic part of the IPEEE program at Nebraska Public Power District and Entergy Operations, October-November 1991.

Co-author, SAIC External Events Analysis Products and Services Marketing brochure, September 1991.

SAIC Internal Report, Applicability of Seismic Margins Methods to The Seismic Assessment of the Existing DOE Gaseous Diffusion Uranium Enrichment (UE) Facilities, January 1991.

Toledo Edison Davis-Besse PRA: Steam Generator Tube Rupture Analysis, 1990.

Toledo Edison Davis-Besse PRA: Service Water, Component Cooling Water and Makeup systems Notebooks, 1989-1990.

Presentation of the Toledo Edison Operating Experience Assessment Program to the Institute of Nuclear Power Operations (INPO), Atlanta, Georgia, 1987.

Toledo Edison Davis-Besse Plant Performance Department: Procedure for the Analysis of Plant

Operating Experience (SEE-IN INPO program), 1987.

ESCOM Principal Submission KPS-9: Safety Analysis of Koeberg Power Station, 1986.

Seismic Design/Analysis Course, taught to ESCOM design engineering and plant technical support groups, Johannesburg, July 1985; Capetown, August 1985.

ESCOM Supporting Submission KSS 6.3: Seismic Design Analysis of Koeberg Power Station, 1983.

General Atomic Co.: Topical Report-Proprietary: Core Flow Test Program/Analysis of a Full-Scale HTGR Core Region with Crossflows, 1980.

General Atomic Co.: Topical Report-Proprietary: Core Flow Test Program/Analysis of a Full-Scale HTGR Core Region without Crossflows, 1979.

General Atomic Co.: Topical Report-Proprietary: Core Flow Test Program/Analysis of Crossflow Distribution in Two Adjacent HTGR Core Elements, 1979.

General Atomic Co.: Topical Report-Proprietary: Graphite Permeability effect on Flow Distribution in New HTGR Core Regions, 1978.

Babcock & Wilcox Co. (co-authored with R. Hiatt): MABO: A Computer Program for the Statistical Analysis of Fuel Densification Data Following Resintering Tests, 1977.

Lori A. Williams

1426 San Rafael Ave. NE
Albuquerque, NM 87122
(505) 856-1709

Education: Associate Degree of Computer Science, University of New Mexico -- 1983
Bachelors of Science Degree, University of Colorado -- 1977

Experience: **Science Applications International Corporation July 1993:**

Worked as a part time employee on a graphical user interface (GUI) for a ground water hydrology program written in the C++ language. I wrote a user's manual and documentation for the prototype version of this interface.

Sandia National Laboratories December 1984 - May 1988

I was employed by the Integrated Circuits Department as an applications programmer. I wrote software for graphical interfaces for existing software. I wrote, modified and maintained software for electrical engineers doing simulations and circuit verification. I also wrote some system software, such as printer drivers. Most software was written for a UNIX based group of networked workstations, but I also worked on a VAX/VMS computer and the Sandia Laboratory Computer Center mainframes. Most software was written in the C and Pascal languages, but some FORTRAN was used. The group used a top down structured approach to programming using a variety of software development tools.

Los Alamos National Laboratory August 1981 - October 1984

I was employed as an applications programmer for a large laser fusion project. I wrote graphical operator interfaces using touch screen technology and color graphics. I wrote programs for both controlling hardware and data retrieval, storage and modification. The group used a top-down approach to programming with walk-throughs of software as well as a strong configuration control of the software. The application programs were written in the C language on a UNIX VAX based systems.

Currently I do volunteer work at my child's school. I have been on the PTA board of Directors, as well as a founding officer of the Friends of the Library. I have desktop published the PTA newsletter. I also did the layout and design of a cookbook as a school fund raising project.

References: Mr. Ken Brinster, SAIC Div. Mgr. 247-8787
Mr. Walt Beyeler, SAIC Sr. Hydrologist 247-8787

Raymond F. Sartor

5258 Cobb Drive
Dayton, OH 45431

(513) 253-9383

EDUCATION

Ph.D. Nuclear Engineering (June, 1995) Ohio State University, Columbus, OH
M.S. Nuclear Engineering May, 1986 Texas A&M University, College Station, TX
B.S. Nuclear Engineering May, 1984 Texas A&M University, College Station, TX

EXPERIENCE

- Experienced in thermal-hydraulic analysis of reactor accidents, including the simulation of reactor accidents using the TRAC-PF1/MOD2 computer code.
- Experienced in Monte Carlo methods for neutron and gamma transport, including the use of the MORSE-SGC computer code.
- Familiar with the Westinghouse 4-loop reactor design and LOCA analyses.
- Familiar with the Savannah River Plant production reactor design.

EMPLOYMENT

Ohio State University
Columbus, OH

Graduate Research Assistant
June 1992 - December 1993

- Performed staff engineer functions for American Electric Power Service Corporation on their **Design Basis Reconstitution Project** for the Donald C. Cook Nuclear Plant.
- Authored the *Design Basis Document for RCS Boundary Faults*. This document details how the plant design (including technical specifications and operational procedures) and the accident analyses for the Large- and Small-Break Loss of Coolant Accidents (including the analysis methodology and the individual input parameters) interact with each other and with nuclear power plant regulations.
- Edited the *Design Basis Document for the Auxiliary Feedwater System*.
- Co-authored the *Project Instructions* manual that details the procedures for locating, evaluating, and reporting design basis information.

Science Applications International Corporation
Albuquerque, NM

Staff Engineer
August 1987 - August 1989

- Performed thermal-hydraulic analyses of the Savannah River Plant production reactors for Level II Probabilistic Risk Analyses.
- Used the TRAC-PF1/MOD2 computer code to model reactor transients during Loss of Pumping, Loss of Coolant, and Reactivity Insertion Accidents.

Technadyne Engineering Consultants
Albuquerque, NM

Computer Programmer
July 1986 - August 1987

- Augmented General Electric's Computer Services staff at the Department of Energy's Pinellas Park Plant in Largo, Florida.
- Wrote and maintained programs for the Product Scheduling System for developing and maintaining manufacturing and shipping schedules.

Sandia National Laboratories
Albuquerque, NM

Summer Graduate Student
June 1985 - August 1985

- Analytically determined the amount of gamma radiation enhancement resulting from use of cadmium loaded polyethylene slabs in experimental assemblies irradiated by the Sandia Pulse Reactor III.
- Performed computer simulations using the MORSE-SGC code to calculate the neutron-gamma flux spectrum behind the slab assembly.

PUBLICATIONS

R. F. Sartor, "A Theoretical Model of Supersonic Steam Nozzle Operation," Ph.D. Dissertation, Ohio State University, Columbus, Ohio, (June 1995).

R. F. Sartor, R. T. Perry, and T. A. Parish, "Monte Carlo Determination of the Energy-Dependent Neutron-Gamma Flux Behind Cadmium Loaded Polyethylene Slabs Irradiated by the Sandia Pulse Reactor III," Proceedings of the Fast Burst Reactor Workshop, Albuquerque, New Mexico, April 1986.

R. F. Sartor, "Monte Carlo Determination of the Neutron-Gamma Spectrum Behind Cadmium Loaded Polyethylene Slabs Irradiated by the Sandia Pulse Reactor III," M.S. Thesis, Texas A&M University, College Station, Texas, May 1986.

PRESENTATIONS

C. N. Amos, K. A. Williams, D. L. Y. Louie, R. F. Sartor, and N. D. Woody, "Application of TRAC to the Savannah River Reactor PRA," American Nuclear Society Annual Meeting, June 10-14, 1990.

C. N. Amos, J. W. Samuels, D. L. Y. Louie, R. F. Sartor, and N. D. Woody, "TRAC-PF1/MOD2 Analysis of Severe Transients at the Savannah River Site Reactors," American Nuclear Society Annual Meeting, June 10-14, 1990.

PROFESSIONAL AND HONOR SOCIETIES

American Nuclear Society

Alpha Nu Sigma Honor Society (Texas A&M University)

Alpha Nu Sigma Honor Society (Ohio State University)

Phi Kappa Phi Honor Society

Dale M. Snider
3506 Finfeather #1016
Bryan, TX 77801
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Internet: dms1242@monet.tamu.edu

EXPERIENCE

1991 - present

Graduate research assistant, Texas A&M University

- Developed an inexpensive method of measurement and image analysis of a mixing layer.
- Developed a multiphase, two-dimensional Eulerian computer program.
- Applied a two-phase turbulence model to Rayleigh-Taylor mixing.
- Applied a k- ϵ mixing model to predicting the mixing layer growth rate.

1991 - 1993

Consultant, EG&G Inc.

- Added enhancements to the RELAP5 thermal hydraulic code.
- Provided computer graphic models for a visualization code.

1973 - 1991

Senior Engineering Specialist, Idaho National Engineering Laboratory

- Analyzed the transient fluid mechanics and heat transfer in a high pressure, two-phase system. These were a variety of experimental and engineering studies in two-phase mixing, choked flow, heat transfer (nucleate boiling through CHF to liquid deficient regime), condensation, etc.
- Supervised an engineering staff in the calculation and analysis of the transient thermal and hydraulic behavior of experimental modeled nuclear plant systems.
- Experimental and analytical study of the radiant heating of stagnant water. This was a combined conduction and radiation heat transfer study in a semi-transparent medium.
- Participated in the design of experiments and specification of tests in a two-phase experimental facility.
- Developed computer analysis tools for processing and studying experiment data such as an inverse heat conduction problem.
- Co-developed an engineering data management system.
- Developed a PC based graphical interface to a probability risk assessment program.
- Developed numerous computer based applications and libraries.
- Technical leader in the development of a graphical visualization tool for system analysis codes.
- Principle investigator on projects, with responsibility for proposals, budget, schedule, and direction of engineering team. Consulted with senior technical and managerial people, both internal and external to the Laboratory in defining project goals, schedule and budget.

1971 - 1973

Graduate research assistant, Purdue University

- Experimentally and analytically studied the radiant heating of stagnant water. This was a combined conduction and radiation heat transfer problem in a semi-transparent media.

EDUCATION

Ph.D. Mechanical Engineering (Expected August 1994)

Texas A&M University, College Station, TX, (GPA 3.7/4.0)

Dissertation: *Rayleigh-Taylor and Shear Driven Mixing with Unstable Thermal Stratification*

Advisor: Professor Malcolm J. Andrews

M.S. Mechanical Engineering (1973)

Purdue University, West Lafayette, IN (GPA 5.9/6.0)

Thesis: *Modeling Stratified Waters with Thermal Radiation as a Boundary Condition*

Advisor: Professor Ray Viskanta

B.S. Mechanical Engineering (1969)

Arizona State University, Tempe, AZ (GPA 2.9/4.0)

REFERENCES

Malcolm J. Andrews, Professor, Mechanical Engineering Department, Texas A&M University, College Station TX, 77843, Home: (409) 776-8815, (409) 847-8843.

Yassin Hassan, Professor, Nuclear Engineering Department, Texas A&M University, College Station TX, 77843, Home: (409) 693-4515, Work: (409) 845-7090.

August Cronenberg, Consultant, Engineering Science and Analysis, Suite 212, 8015 Mountain Road Pl., N.E., Albuquerque, NM 87110, Home: (505) 275-2165, Work: (505) 266-0300.

Brent Stacey, Manager, Idaho National Engineering Laboratory, Idaho Falls, ID, Work: (208) 526-9843.

Kurt Wagner, Engineering Specialists, Idaho National Engineering Laboratory, Idaho Falls, ID, Home (208) 524-1547, Work: (208) 526-9531.

REFEREED JOURNAL PAPERS

D.M. Snider and M.J. Andrews, "The structure of shear driven mixing with an unstable thermal stratification," submitted *ASME J. of Fluid Engineering*.

D.M. Snider and M.J. Andrews, "Rayleigh-Taylor and shear driven mixing with an unstable thermal stratification," accepted May, 1994 to *Physics of Fluids*.

D.M. Snider, *The Buoyancy Unstable Thermal Stratification of a Plane Mixing Layer with Shear*, PhD Thesis, Texas A&M University, to be completed 1994.

H.R. Bruestle, D.M. Snider, K.R. Russell, and H.D. Stewart, "ISDMS - A scientific data management system", *Software Practices and Experience*, 15, pp 473-487, 1985.

D.M. Snider, "The thermal-hydraulic phenomena resulting in early CHF and rewet in the Semiscale core", *Trans ASME, Series C, J Heat Transfer*, 101, 1979.

D.M. Snider and R. Viskanta "Radiation induced thermal stratification in surface layers of stagnant water", *Trans ASME, Series C, J Heat Transfer*, 97, pp 30-40, 1975.

D.M. Snider and R. Viskanta, "Combined conduction radiation energy transfer in stagnant water", *Water Resour. Res.*, 10 pp 939-946, 1974.

CONFERENCE PAPERS

D.M. Snider and M.J. Andrews, "Shear and Rayleigh-Taylor driven mixing with an unstable thermal stratification," *Boundary Layer and Free Shear Flows*, ed. J. F. Donovan and J.C. Dutton, ASME Fluids Summer Meeting, 1994.

D.M. Snider and M.J. Andrews, "Rayleigh-Taylor mixing due to unstable stratification: preliminary experimental results," *4th International Workshop on the Physics of Compressible Turbulent Mixing*, 1993.

D.M. Snider, K.L. Wagner and W. Grush, "Nuclear Plant Analyzer Applied to Fuel Rod Damage," *Transactions American Nuclear Society*, TANSO 631 1-464, 1991.

D.M. Snider, "Analysis of the Thermal-hydraulic Phenomena Resulting in Early Critical Heat Flux and Rewet in the Semiscale Core," *Nuclear Reactor Safety Heat Transfer*, 1977.

R. Viskanta and D.M. Snider "Stability of water cooled from above," *Water for Human Environment*, 4, pp 3-14, International Water Resources Association, IL, 1974.

D.M. Snider and R. Viskanta "Thermal Stratification by Radiation in Surface Layers of Stagnant Water," AIAA Paper 74-737, AIAA/ASME 1974.

T.K. Larson, D.M. Snider and L.V. Lords, "post critical heat transfer in the Semiscale core during blowdown with reverse flow," *Transactions 17th National Heat Transfer Conference*, SLC UT, 1977.

H. Kuo, V.H. Ransom and D.M. Snider, "Calculating thermal-hydraulic response for Semiscale Mod-3 Test S-07-6 Using RELAP5 - A new LWR system analysis code," *Proceedings Nuclear Reactor Thermal Hydraulic Confr*, Saratoga, NY, 1980.

REPORTS

D.M. Snider, K.L. Wagner and W. Grush, *Nuclear Plant Analyzer*, EGG-EAST-9096, EG&G Idaho, 1991.

D. M. Snider and K.L. Wagner, *Computer Visual System (CVS) Reference Manual*, EGG-IS-6478, EG&G Idaho, 1990.

D.M. Snider and K.L. Wagner, *Crystal Graphics - Two Dimensional Graphics in Modula 2*, Ver 2.0, EGG-CATT-8320, 1988.

K.D. Russell, D.M. Snider, et al, *Integrated Reliability and Risk Analysis System (IRRAS) User's Guide* Ver 1.0, NUREGCR-4844 EGG-2495, 1987.

D.M. Snider, *INVERT 1.0 - A Program for Solving the Nonlinear Inverse Heat Conduction Problem for One Dimensional Solids*, EGG-2068, EG&G Idaho, 1980.

H.R. Bruestle, K.D. Russell, D.M. Snider and H.D. Stewart, *Idaho National Engineering Laboratory Scientific Data Management System*, Release 1.1, EGG-IS-5287, EG&G Idaho, 1980.

D.J. Hanson, et al.; *ECC Performance in the Semiscale Geometry*, ANCR 1161, Aerojet Nuclear Co., Idaho Falls, ID June 1974.

R. Viskanta, D.M. Snider and M. Behni, *Laboratory Modeling of Thermal Structure in Stagnant Water*, Tech Report No. 62, Purdue Univ Water Resource Center, W. Lafayette, IN, 1975.

Yoram Yadlin

118 Wellington Cr.

Lebanon, New Hampshire 03766

Home: (603) 448-9291

Work: (603) 643-2600

Education

• **Cornell University, Ithaca, NY 14853**

- **Ph.D. in Mechanical and Aerospace Engineering, August 1990**
Minor field: Applied Mathematics
Courses in: fluid mechanics, aerodynamics, computational methods, applied mathematics, CAD.
Thesis subject: "Block Implicit Multigrid Solution of the Euler Equations".
- **Master of Engineering Degree, May 1987**
Sibley School of Mechanical and Aerospace Engineering
Master's Design Project: "Calculation of Flow Around Airfoils in Free Air and Wind Tunnels Using Euler's Equation".
Grade Point Average: 3.78
- **Bachelor of Science Degree, June 1986**
College of Agriculture and Life Sciences
Department of Agricultural Engineering
Graduation with Distinction
Grade Point Average: 3.77

Professional Experience

- **Software Development Engineer** September 1992 - Present
Fluent Inc.
Lebanon, New Hampshire.
Worked on development/enhancement of Computational Fluid Dynamics codes.
- **Postdoctoral Research Associate** September 1991 - September 1992
Dep. of Mechanical Engineering
Ben-Gurion University of the Negev, Beer-Sheva Israel.
- **Postdoctoral Research Associate** September 1990 - August 1991
Center for Theory and Simulation in Science and Engineering
Cornell University, Ithaca New York:
Conducted Research on new algorithms for Computational Fluid Dynamics.
- **Teaching Assistant** Fall 1986, Spring 1989
Cornell University, Ithaca New York.
- **Design Consultant** 1983-1985
Netafim Irrigation, Inc., Valley Stream, NY:
Designed small drip/trickle irrigation systems. Traveled to advise clients on implementation. This work has been done part time while attending Cornell University.
- **Design Consultant** 1980-1982
Netafim Irrigation, Inc., Kibbutz Hazerim, Israel:
Designed large scale drip/trickle irrigation systems. Advised clients on implementation and operation of the systems in the field. Included projects in U.S., Italy, Yugoslavia, and Israel.
- **Pilot, Flight Instructor** 1972-1980
Israeli Air Force, Israel:
Served as an active fighter pilot, including two years as flight instructor. Logged 1,500 flight hours on jet planes.

Research/Development Work

My work at Fluent Inc. has focused on improving the commercial CFD codes developed here. I have been working on the unstructured, adaptive, multigrid code RAMPANT both on improving the numerical scheme and the user-interface. I have been working with our clients on implementing different physical models to accommodate their specific requirements.

Graduate Work

My research at Cornell focused on the development and implementation of diagonal implicit algorithms for the efficient simulation of external aerodynamic flows, mostly in the transonic regime. The algorithms have been implemented within the framework of the multigrid method, which allows high convergence rates. In order to make the algorithm suitable to simulate flows past complex geometries, an investigation into the concept of block-structured grids has been initiated, resulting in development of a new multigrid method applicable to block-structured grids. Another aspect of my research was studying ways to implement the multigrid implicit algorithms on shared-memory parallel computers.

Honors & Affiliations

- Member of American Institute of Aeronautics and Astronautics
- NSF Postdoctoral fellowship 1990/91
- Wolf Foundation Postdoctoral fellowship 1991/92
- Graduate Research Assistantship (Cornell University) 1987-89
- McMullen Dean's Scholarship
- John McMullen Graduate Fellowship 1987-88
- Post Scholar 1986-87
- Dean's List Fall 1983 through Spring 1986 (six consecutive semesters)

Special Training & Interests

- Programming languages: (FORTRAN, C, Scheme).
- Commercially licensed pilot.
- Music, Skiing.
- Languages: fluent English and Hebrew.

Personal Information

- Citizenship: Israeli and U.S.
- Age 39, married, 4 children.

References

- Available upon request

Publications

1. Yadlin, Yoram and Caughey, David A. "Diagonal Implicit Multigrid Solution of the Three-Dimensional Euler Equations," *Proceedings of the Eleventh International Conference on Numerical Methods in Fluid Dynamic*, Lecture Notes in Physics, Springer-Verlag, New York, 1989, pp. 597-601.
2. Yadlin, Yoram and Caughey, David A. "Block Multigrid Implicit Solution of the Euler Equations of Compressible Fluid Flow". *AIAA Journal*, 29(5):712-719, May 1991. (Also AIAA Paper 90- 0106)
3. Yadlin, Yoram "Block Implicit Multigrid Solution of the Euler Equations," PhD Thesis, Cornell University (August 1990).
4. Yadlin, Yoram and Caughey, David A. "Block Implicit Multigrid Solution of the Euler Equations on a Parallel Computer," H. D. Simon (Ed.), *Parallel Computational Fluid Dynamics*, pp 127-145, MIT Press 1992.
5. Yadlin, Yoram and Caughey, David A. "Parallel Computing Strategies for Block Multigrid Implicit Solution of the Euler Equations," 32nd Israel Annual Conference on Aviation and Astronautics, February 18-20, 1992 Israel.
6. Yadlin, Yoram and Caughey, David A. "Parallel Computing Strategies for Block Multigrid Implicit Solution of the Euler Equations". *AIAA Journal*, 30(8):2032-2038, August 1992.
7. Spragle, G.S, Smith, W.A. and Yadlin Y. "Application of an Unstructured Flow Solver to Planes, Trains and Automobiles" AIAA paper 93-0889, Reno, NV 1993