

EXPLORATORY RESEARCH ON MODEL - BASED SIMULATION

Program Solicitation

NSF 00-26

DIRECTORATE FOR ENGINEERING
DIVISION OF CIVIL AND MECHANICAL SYSTEMS

DEADLINE DATE: MARCH 23, 2000, 5:00 PM (your local time)



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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Name: EXPLORATORY RESEARCH ON MODEL-BASED SIMULATION

Short Description/Synopsis of Program:

The Engineering Directorate of the National Science Foundation (NSF) announces a research initiative on model-based simulation (MBS). The primary objective of this initiative is to foster an integration of computational sciences, modeling and information technologies for simulating and visualizing the behavior of complex engineering and natural systems in structures, geotechnical, controls and dynamics, solid mechanics, materials engineering, manufacturing and materials processing, civil infrastructure systems and construction management. While the approach is used in the automotive, aerospace and defense-related industries, the primary limitations to a broader use of MBS arise from lack of regularity of the underlying engineering system, and scalability problems. Because the Internet looms large as a deployment environment, issues of scalability will be crucial in the development of this initiative.

For further information you may contact the following Program Directors within the Civil and Mechanical Systems Division on (703) 306- 1361 in Room 545:

Solid Mechanics and Materials Engineering (SMME) Programs

Ken P. Chong, Program Director, e-mail: kchong@nsf.gov; Jorn Larsen-Basse, Program Director, e-mail: jlarsenb@nsf.gov; Daniel C. Davis, Program Director, e-mail: dcdavis@nsf.gov.

Dynamic System Modeling, Control and Autoadaptation (DSMCA) Program

Alison Flatau, Program Director, e-mail: aflatau@nsf.

Infrastructure and Information Systems (IIS) Program

Shih-Chi Liu, Program Director, e-mail: sliu@nsf.gov

Geotechnical Systems and Engineering (GSE) Program

Cliford Astill, Program Director, e-mail: castill@nsf.gov.

Structural Systems and Engineering (SSE) Program

John Scalzi, Program Director, e-mail: jscalzi@nsf.gov; Vijaya Gopu, Program Director, e-mail: vgopu@nsf.gov.

For further information you may contact the following Program Directors within the Advanced Computational Infrastructure and Research Division on (703) 306-1970, in Room 1122:

Richard Hirsh, Deputy Division Director, rhirsh@nsf.gov; Charles Koelbel, Program Director, e-mail: ckoelbel@nsf.gov.

For further information you may contact the following Program Director within the Design, Manufacturing and Industrial Innovations Division, on (703) 306-1395 in Room 550:

Kamlakar P. Rajurkar, Program Director, e-mail: krajurka@nsf.gov

ELIGIBILITY

- ◇ Limitation on the categories of organizations that are eligible to submit proposals: **Proposals may be submitted by U.S. Academic Institutions in support of individual investigators or small groups.**
- ◇ PI eligibility limitations: Only one proposal may be submitted by a Principal Investigator; however, a Principal Investigator for one proposal may be a co-Principal Investigator on other proposals.
- ◇ Limitation on the number of proposals that may be submitted by an Institution: **None**

AWARD INFORMATION

TYPE OF AWARD ANTICIPATED: STANDARD GRANT

- ◇ Number of awards anticipated in FY 2000: **A maximum of 15 awards**
- ◇ Estimated Amount of funds available: **\$2.0 million in FY 2000**
- ◇ Anticipated date of award: **July 2000**
- ◇ Duration of awards: **Up to 18 months**

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

◇ **Proposal Preparation Instructions**

- ⇒ Letter of Intent requirements: **None**
- ⇒ Preproposal requirements: **None**
- ⇒ Proposal preparation instructions: **Standard NSF Grant Proposal Guide instructions**
- ⇒ Supplemental proposal preparation instructions: **None**
- ⇒ Deviations from standard (GPG) proposal preparation instructions: **None**

◇ **Budgetary Information**

- ⇒ Cost sharing/matching requirements: **None**
- ⇒ Indirect cost (F&A) limitations: **None**
- ⇒ Other budgetary limitations: **Award amounts not to exceed \$150,000 for maximum of 18 months for proposals submitted in response to this solicitation.**

◇ **FastLane Requirements**

- ⇒ FastLane proposal preparation requirements: **FastLane use required**
- ⇒ FastLane point of contact: **Janie Harris; Phone: 703-306-1362; email: jharris@nsf.gov**

◇ **Deadline/Target Dates**

⇒ Full Proposal Deadline: **5:00 PM your local time, March 23, 2000 (FastLane)**

PROPOSAL REVIEW INFORMATION

⇒ Merit Review Criteria: **Standard National Science Board approved criteria.**

AWARD ADMINISTRATION INFORMATION

⇒ Grant Award Conditions: **GC-1 or FDP III**

⇒ Special grant conditions anticipated: **None anticipated**

⇒ Special reporting requirements anticipated: **None**

INTRODUCTION

The Engineering Directorate of the National Science Foundation (NSF) announces a research initiative on model-based simulation (MBS). The primary objective of this initiative is to foster an integration of computational sciences, modeling and information technologies for simulating and visualizing the behavior of complex engineering and natural systems in structures, geotechnical, controls and dynamics, solid mechanics, materials engineering, manufacturing and materials processing, civil infrastructure systems and construction management. While the approach is used in the automotive, aerospace and defense-related industries, the primary limitations to a broader use of MBS arise from lack of regularity (or non-smoothness) of the underlying engineering system, and scalability problems. Nonsmooth problems are characterized by abrupt discontinuity in the problem formulation, including such phenomena as failure of a connection detail (e.g., rivet or bolt failure, bearing failure, etc.) or large-scale contact/impact simulations that exceed the capacity of available computers. Scalability problems result from using commercial or locally-developed codes that cannot solve problems of the requisite size, usually because the underlying simulation codes perform purely sequential calculations.

Background

The exponential growth of computer speed and capacity over the last two decades has led to the development of computational science and engineering as a unique and powerful tool for scientific discovery. One key branch of this new discipline is model-based simulation (MBS), whose objective is to develop the capability for realistically simulating the behavior of complex systems under the loading and environmental conditions that the systems experience. Model-based simulation is literally creating a new window into the natural and technological worlds. It is as valuable as theory and experimentation for scientific discovery and technological innovation in that model-based simulation provides a framework for combining theory and experimentation with advanced computation. Besides massive numerical computations, high performance computers permit the use of other tools, such as visualization and global communications using advanced networks, all of which contribute to the ability to understand and to control the physical processes governing complex systems. Expected increased accessibility within the next five years by the national scientific and engineering communities to computing systems whose performance is approximately one-thousand times greater than computers now widely available will enable MBS to become a practical engineering methodology. MBS will allow engineering researchers and practitioners to gain understanding of the engineered systems; make informed decisions on the design, construction, and performance of systems; enable technological innovation; and ultimately, provide the tools to revolutionize engineering practice in the 21st century.

Applications in Civil and Mechanical Systems

The design of civil and mechanical systems stands to benefit immensely from MBS because of their intrinsically complex nature, which involves materials that exhibit highly nonlinear behavior, multiple spatial and temporal scales, and different types of components whose behavior is governed by different physics. Possibly with the aid of MBS, complex physical phenomena (such as the processes by which buildings or bridges collapse, or soil liquefies during an earthquake) that are crudely understood today will be fully understood from first principles in the near future. This will naturally lead to improved design methodologies that are based on realistic simulations of performance, as compared with current procedures in which performance is implicit and poorly-understood. With design based upon models, engineers can run high-fidelity simulations to test new materials, components, and systems before investing valuable resources in construction.

Moreover, civil and mechanical systems, in general, and structural and geotechnical systems, in particular, are associated with large uncertainties in their material properties and applied loads. By monitoring the system behavior, model-based simulation can be used in conjunction with inverse methods to reduce the level of uncertainty by better identifying the material characteristics, the loading environment, and even adapting the model itself, thereby allowing one to increase considerably the reliability of the system to achieve specified performance goals. In addition, simulation and monitoring of the behavior of a complex system during construction, such as a large airport facility or building complex, can guide the engineer in making real-time decisions about changes in the design or construction process. In the future, it can be imagined that models will live concurrently with the systems they represent to provide owners and operators ongoing information that can be used in assessing operations and future performance.

PROGRAM DESCRIPTION

In order to identify basic research issues in this area, a workshop was held at NSF on June 24-25, 1999. Twenty-four participants representing industry, government and academe shared their perspectives and identified a set of research issues deemed relevant to the development of this area. Details on this workshop and a white paper on the topic can be found at <http://caswww.colorado.edu/MBS.Workshop.d/index.html>. Since a broad set of issues was identified, the consensus was that an initiative in this area should first consist of an exploratory stage followed by more in-depth investigation. This solicitation has been developed to emphasize high risk/high return, exploratory studies of model-based simulation (MBS). Future competitions related to MBS are expected in FY 2001. These competitions may be in the exploratory form again, or they may request full proposals for a three (3) or more years duration.

As a result of this current solicitation, it is anticipated that up to 15 exploratory proposals, subject to quality considerations, will be funded. The budget level of each proposal is not to exceed \$150,000 for a maximum of 18 months. Emphasis will be placed on model synthesis, material modeling, integration of heterogeneous models, representation and propagation of uncertainty, model updating, scientific visualization, and computational science and information technologies as they relate specifically to model-based simulation. We seek novel ideas that are NOT already widely researched and published. It is particularly important that the proposals be specific and highly focused. The research should lead to concrete advances in clearly defined contexts. The inclusion of practical examples and prototypes is strongly encouraged. Proposals should explicitly address *scalability* including the ability of the model-based simulation to be deployed with increasing returns to scale and decreasing costs to scale. Proposals must include an impact statement expressing how the research will contribute to the improved understanding, development and/or operation of model-based simulation.

Proposals are encouraged to have a focus on one or more of the seven (7) basic research themes listed below; however, proposals are not limited to these seven (7) research themes. Proposals may consist of prototype developments that incorporate one or more research themes to illustrate the principles underlying MBS.

1. *Model synthesis* including parameter identification, updating and validation to yield models that are computationally tractable, and appropriately validated so that they are credible design and decision tools.

2. *Material modeling* to represent a broad range of conditions and to address multiconstituent, multiscale and multiphysics issues, and the capability to model interfaces between components.
3. *Integration of heterogeneous models* to assure high-fidelity simulation of civil and mechanical systems.
4. *Representation and propagation of uncertainty* in a complete and consistent manner from model parameters (e.g., model properties and human decision-making) to a probabilistic estimate of performance.
5. *Model updating and validation* using techniques (e.g., sensitivity and optimization) to adjust parameters and sizes so that the model matches observed performance.
6. *Scientific visualization* including animation, field-based display schemes for scalar/vector/tensor-valued solution fields and the use of color and other cues to allow engineers to compare multiple simulations of different models.
7. *Computational science and information technologies* including use of parallel numerics, adaptive refinement of computed solutions, improved analytic formulations, innovative software systems for support of distributed computing architectures, data management and abstraction tools.

Engineering education can be changed and improved by use of a number of techniques and tools. We envision that information technology can be used creatively to help achieve this end by presenting new opportunities to learn through inquiry rather than through simple transmission of knowledge. The dynamics of shared student-teacher interaction in a research setting is a strong stimulus for student learning. Students benefit greatly from this type of interaction and we strongly recommend any opportunity for students to work with senior researchers. Model-based simulation is a compelling area that can be used for learning at both undergraduate and graduate levels. Therefore, proposals must include a plan for effective integration of model-based simulation into engineering education in such areas as simulation, uncertainty, nonlinear behavior and visualization, including parallel computing.

ELIGIBILITY

Proposals may be submitted by U.S. academic institutions in support of individual investigators or small groups. Synergistic collaboration among researchers and collaboration or partnerships with industry or government laboratories is encouraged when appropriate; however, NSF funding will be limited to U.S. academic institutions. Only one proposal may be submitted by a Principal Investigator; however, a Principal Investigator for one proposal may be a co-Principal Investigator on other proposals.

AWARD INFORMATION

NSF anticipates funding up to 15 exploratory proposals at levels up to \$ 150,000 for 18 months. The number of awards will be subject to the availability of funds and the quality of the proposals. Awards are expected to be made in July 2000.

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions.

Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 00-2. The complete text of the GPG (including electronic forms) is available electronically on the NSF Web site at: <<http://www.nsf.gov/>>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

Electronic submission through the NSF FastLane system is required. Proposers are reminded to identify the program announcement number (NSF 00-26) in the program announcement/solicitation block on the NSF Form 1207, "*Cover Sheet for Proposal to the National Science Foundation.*" Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Proposal Due Dates.

All proposals **MUST** be submitted electronically via FastLane by 5:00 PM, your local time, March 23, 2000. Signed proposal cover sheet and one hard copy of the proposal must be submitted in accordance with the instructions identified below.

Submission of Signed Cover Sheet and One Hard Copy of Proposal. The signed proposal Cover Sheet (NSF Form 1207) and one hard copy of the proposal should be forwarded to the following address and received by NSF by March 30, 2000:

**MBS Announcement
Division of Civil and Mechanical Systems
National Science Foundation
4201 Wilson Blvd.
Room 545
Arlington VA 22230**

A proposal may not be processed until the complete proposal (including signed Cover Sheet) has been received by NSF.

C. FastLane Requirements.

Detailed instructions for proposal preparation and submission via FastLane are available at <http://www.fastlane.nsf.gov/a1/newstan.htm>.

Submission of Signed Cover Sheets. For proposals submitted electronically, the signed paper copy of the proposal Cover Sheet (NSF Form 1207) should be forwarded to NSF within five working days following proposal submission in accordance with FastLane proposal preparation and submission instructions referenced above.

PROPOSAL REVIEW INFORMATION

A. Merit Review Criteria.

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority serving institutions, adjacent disciplines to that principally addressed in the proposal.

Proposals will be reviewed against the following general merit review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

PIs should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give these factors careful consideration in making funding decisions.

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- are essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement will be reviewed by panels.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. In most cases, proposers will be contacted by the program officer after his or her recommendation to award or decline funding has been approved by his or her supervisor, the division director. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals in this category. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. The interval ends when the division director accepts the program officer's recommendation.

In all cases, after final programmatic approval has been obtained, award recommendations are then forwarded to the Division of Grants and Agreements for review of business, financial and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with an NSF program officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants Officer does so at its own risk.

AWARD ADMINISTRATION INFORMATION

A. Notification of the Award.

Notification of the award is made *to the submitting organization* by a Grants Officer in the Division of Grants and Agreements (DGA). Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator.

B. Grant Award Conditions.

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable grant conditions, such as Grant General Conditions (NSF GC-1)* or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

* These documents may be accessed electronically on NSF's Web site at: <<http://www.nsf.gov/>>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be ordered through the GPO Web site at: <<http://www.gpo.gov/>>. The telephone number at GPO for subscription information is 202.512.1800.

C. Reporting Requirements.

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after expiration of a grant, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented a new electronic project reporting system, available through FastLane, which permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and, other specific products and contributions. Reports will continue to be required annually and after the expiration of the grant, but PIs will not need to re-enter information previously provided, either with the proposal or in earlier updates using the electronic system.

Effective October 1, 1999, PIs are required to use the new reporting system for submission of annual and final project reports.

D. New Awardee Information.

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the NSF *Grant Policy Manual* which are applicable to most NSF awards. The "Prospective New Awardee Guide" (NSF 99-78) includes information on: Administration and Management Information; Accounting System Requirements and Auditing Information; and Payments to Organizations with Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at: <<http://www.nsf.gov/cgi-bin/getpub?nsf9978>>.

CONTACTS FOR ADDITIONAL INFORMATION

For questions related to use of FastLane, refer to <http://www.fastlane.nsf.gov>, or contact the CMS FastLane Coordinator: Janie Harris; Phone: 703-306-1362; email: jharris@nsf.gov.

For further information you may contact the following Program Directors within the Civil and Mechanical Systems Division on (703) 306- 1361 in Room 545:

Solid Mechanics and Materials Engineering (SMME) Programs

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Structural Systems and Engineering (SSE) Program

John Scalzi, Program Director, e-mail: jscalzi@nsf.gov; Vijaya Gopu, Program Director, e-mail: vgopu@nsf.gov.

For further information you may contact the following Program Directors within the Advanced Computational Infrastructure and Research Division on (703) 306-1970, in Room 1122:

Richard Hirsh, Deputy Division Director, rhirsh@nsf.gov; Charles Koelbel, Program Director, e-mail: ckoelbel@nsf.gov.

For further information you may contact the following Program Director within the Design, Manufacturing and Industrial Innovations Division, on (703) 306-1395 in Room 550:

Kamlakar P. Rajurkar, Program Director, e-mail: krajurka@nsf.gov

OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF Bulletin, available monthly (except July and August), and in individual program announcements. The Bulletin is available electronically via the NSF Web Site at <http://www.nsf.gov>. The direct URL for recent issues of the Bulletin is <http://www.nsf.gov/od/lpa/news/publicat/bulletin.htm>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement or contact the program coordinator at (703) 306-1636.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal

Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne H. Plimpton, Reports Clearance Officer; Division of Administrative Services; National Science Foundation; Arlington, VA 22230.

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at <http://www.nsf.gov/oirm/y2k/start.htm>.

Catalogue of Federal Domestic Assistance (CFDA) No.: 47.041 – Engineering Grants

OMB No.: 3145-0058

NSF 00-26