Differential Equations
Covers solutions of first - order equations, undetermined coefficient and variation parameter methods of solution of high - order linear equations, applications, systems of equations, and Laplace transform.

Probability and Statistics
Statistical thinking starts with an awareness and understanding that no two things are exactly alike and that variability is inherent in all things. Statistical thinking is the ability to identify, quantify, reduce and control the kinds of variability that reduce the quantity of our performance, of the objects that we make, and of our actions as individuals, groups, and societies. Variability is not inherently undesirable. It is essential to variety and creativity and often enriches our lives.
☐
General Physics I
Algebra - based course that covers force, motion, work, energy properties of matter, and wave motion and sound propagation.

General Physics II
Algebra - based course that covers electricity and applications, magnetism and optics.

Physics I
Calculus based course that covers principals of mechanics pertaining to kinematics, dynamics, momentum, and energy and conservation laws. This course also covers the nature wave motion, including harmonic forces, general wave characteristics, acoustics, geometrical and physical optics.

Physics II
Calculus - based course that temperature, heat, heat transfer, black body, ideal gas, laws of thermodynamics, and heat engines. This course also covers phenomena and principles of electricity and magnetism, including electrostatic, potential theory, capacitance, direct currents, electrical instruments and circuits, magnetic fields, induced EMF, alternating currents, magnetic properties of matter, and inductance.

Appendix B

Description of Undergraduate Courses Taught:

Fundamentals of Materials

Examines principals underlying structure, properties, and behavior of engineering materials, including metals, ceramics, and polymers. Covers topics including bonding; crystal structure; defect structure; alloying; mechanical, electronic, and magnetic properties in relation to structure: phase eqbilbria; phase transformation; and oxidation and corrosion.

Graphical Communication

Covers selected topics in graphics, including SI (metric) units, instruments, orthographic projection, pictorial systems, sectioning, tolerance, dimensioning, specialized drawing, design drawing, graphs, and microcomputer applications.

Construction Materials

Introduces the properties of materials used in construction, including timber, masonry, metals, concrete, bituminous materials, and fiber - reinforced materials.

Statics

Covers principals of mechanics, including vector treatment of force systems, friction, and engineering applications.

Dynamics

Covers kinematics and kinetics of particles and rigid bodies, including force - acceleration, work - energy, impulse - momentum methods, and engineering applications.

Mechanics of Materials

Covers stress and strain at a point, elastic and plastic analysis of deformable bodies, stability, and engineering applications.

Computer Programming FORTRAN

Covers fundamentals of computer programming in the language of instruction (FORTRAN): variable, input and output, expressions, assignment statements, conditional and branching, subprograms, parameter passing, repetition, arrays, top - down design, testing, and debugging.

Calculus I

Covers line, circle, and parabola; functions, limits, continuity, derivatives of algebraic and trigonometric functions and definite integrals and applications.

Calculus II

Covers definite integrals; application; logarithmic. exponential, hyperbolic and inverse trigonometric functions: conic; and parametric equations and various techniques of integration.

Calculus III

Covers indeterminate forms, finite series, and polar coordinates. Solid analytical geometry. vectors, partial derivatives, multiple integrals, and applications.

Linear Algebra

Covers matrix arithmetic, systems of linear equations, vector spaces, coordinate systems, linear transformations, determinants, characteristic value problem, Euclidean spaces, and applications.

Appendix A

Title: Controlled Permeability Chemically Activated Fly Ash (CAFA) for Reactive Contaminant Barrier

Reference: Application Number 45690-97-I, "Controlled Permeability Chemically Activated Fly Ash (CAFA) for Reactive Contaminant Barrier"

Abstract

Past industry and government waste management practices have left a legacy of soil, surface water, and groundwater contamination. The contamination of ground water is the most pressing problem because of its mobility. Without treatment, groundwater migrates and contaminates uncontaminated water. The effective clean up methods such as pump and treat is costly and labor intensive, and other alternatives (i.e. grout walls and sheet piles) are not an effective long term solution.

Chemically Activated Fly Ash (CAFA) is a newly developed material. Preliminary experiments show that Controlled Permeability CAFA as a reactive barrier can filter heavy metals and radionuclides, such as, Cadmium, Chromium, Lead, Zinc, Cesium, and Cobalt from contaminated water. CAFA will be combined with zeolites to create more effective reactive barriers.

In this project, Controlled Permeability CAFA will be tested as follows:

- Creation of CAFA and CAFA with zeolites with various permeability and thickness
- Measurement of heavy metals and radionuclides before and after passing through the barriers
- Optimization of CAFA from the results obtained

In Phase II, demonstration of the technology will be performed at contaminated sites through collaborating with companies involved in remediation and the Department of Energy. The investigation will lead to design criteria, material specifications, quality control methods, and a pilot scale process to verify commercial potential. Corporate partnering will be developed to assist movement of the technology into the marketplace.

Commercial Applications and Other Benefits

Controlled Permeability CAFA will be able to filter contaminants from groundwater and aqueous waste streams. Commercial applications include remediation of groundwater contamination, treatment of industrial waste streams, feed lot and agricultural runoff control, ammonia control, and control of point and non-point sources of pollution. CAFA will offer similar performance to current technologies at much less cost.

Silverstrim, T., Martin, J. and Rostami, H., "High Performance Characteristics of Chemically Activated Fly Ash (CAFA)", Precast Concrete Institute / Federal Highway Administration International Symposium on High Performance Concrete, Chicago, IL 1997.

Silverstrim, T., Ouali, A., Martin, J. and Rostami, H., "Effect of LOI on Chemically Activated Fly Ash (CAFA)", Third Annual Conference on Unburned Carbon on Utility Fly Ash, Pittsburgh, PA 1997.

Rostami, H., Ouali, A., Silverstrim, T. and Martin, J., "New Type of Chemical Resistant, High Strength Fly Ash Concrete", American Ceramic Society, 99 th Annual Meeting, Cincinnati, OH, May 4, 1997.

Silverstrim, T., Rostami, H., "ZeoTech Polymer Concrete: Corrosion Resistant Concrete", 1997 Fall, American Concrete Institute Convention, Technology Transfer Meeting, November 19, 1997.

Silverstrim, T., Martin, J., Xi, Y.and Rostami, H., "High Performance Characteristics of Chemically Activated Fly Ash (CAFA)", Precast Concrete Institute/ Federal Highway Administration International Symposium on High Performance Concrete, October 20-22, 1997.

Silverstrim, T., Rostami, H., Larralda, J., and Samadi, A., "Chemically Activated Fly Ash Material", Patent #5,601,643, Issued February 11, 1997.

Rostami, H. and Silverstrim, T., "Chemically Activated Fly Ash (CAFA); A New Type of Fly Ash Based Cement", Proceedings of the Thirteenth International Pittsburgh Coal Conference, Pittsburgh, PA, 1996.

Zandi, I, Lepore, J., and Rostami, H."Particulate Rubber Included Concrete Compositions" Patent # 5,454,751, Issued September 15, 1994.

Rostami, H., and Kamel, I., "Surface Modification of Carbon Fibers Using RF Plasma, Polymer Composites, 15, 324, 1993.

Rostami, H., Zandi, I., Silverstrim, T., "Recycling of Waste Tire in Concrete". Concrete 2000 International Conference on Concrete Technology, Dundee, Scotland, 1993.

Rostami, H., and Kamel, I., "Surface Modification of Spectra 900 Polyethylene Fibers Using RF Plasma, Polymer Composites, 13, 207, 1992.

PUBLICATIONS

Rostami H., Brendley, W., Alkali Ash Material (AAM), A Novel Fly Ash Based Submitted to the following Environmental Science & Technology Editor:

Rostami H., Brendley, W., and Bahadory, M., "Removal of Cadmium and Chromium from Contaminated Water Using Alkali Activated Fly Ash Permeable Reactive Barrier (AFA-PRB)", Journal of Solid Waste Technologty and Management, Volume 27, Number 3 & 4, Nov. 2001.

Rostami H., Brendley, W., and Bahadory, M., "Utilization of Fly Ash to Produce High Strength Construction Materials", Submitted for publication to the Journal of Solid Waste Technologty and Management.

Rostami H., Brendley, W., and Bahadory, M. ,"Removal of Cesium from Contaminated Water Using Alkali Fly Ash Permeable Reactive Barrier (AFA-PRB) Material". 2000 Conference on Selected Catalytic & Non-Catalytic Reduction fpr NOx Control", U.S. DOE, May 2000.

Rostami H., Brendley, W., and Bahadory, M. ,"Removal of Lead and Zinc from Contaminated Water Using Alkali Fly Ash Permeable Reactive Barrier (AFA-PRB) Material", Proceedings of the Seventeen International Pittsburgh Coal Conference, Pittsburgh, PA, 2000.

Jahanian, S. and Rostami, H., "Alkali Ash Material, A Novel Technique For Infrastructure Enhancement, Part 1: Physical Properties", , Journal of Engineering Structures, Voulme 23, 2001

Rostami, H., and Jahanian, S. "Alkali Ash Material, A Novel Technique For Infrastructure Enhancement, Chemical Properties", Submitted for Publication, Journal of Engineering Structures.

Jahanian, S. and Rostami, H., "Removal of Cadmium from contaminated water" Accepted for publication at 1999 ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, September 12 - 19, 1999, Las Vegas, Nevada

Jahanian, S. and Rostami, H., "Removal of Zinc from contaminated water" Accepted for publication at 1999 ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, September 12 - 19, 1999, Las Vegas, Nevada

Rostami, H., Grega, J., Huxley, N, and Silverstrim, T., :ZeoTech Concrete for Acid Resistance Pipe and Precast Products" Accepted for Publication at Concrete Pipe for the New Millenium, ASTM STP 1368, J.I. Enyart and I. I. Kasper, Eds., ASTM, West Conshhoken, PA.

Rostami, H, Huxley, N, and Silverstrim, T. "Field Installations and Independent Testing of ZeoTech Concrete used for Industrial and municipal Wastewater Systems, Submitted for Publication, Journal of Concrete International.

Rostami, H., Martin, J., Silverstrim, T., "Chemically Activated Fly Ash (CAFA) High Performance Concrete Pipe", 1997 Ash Utilization Symposium, University of Kentucky, October 20-22, 1997.

Rostami, H. and Silverstrim, T. "Chemically Activated Fly Ash Concrete", Proceedings of the Twelfth International Symposium on Use and Management of Coal Combustion By Product (CCBs), Orlando, FL, 1997.

Silverstrim, T., Rostami, H., Clark, B. and Martin, J., "Microstructure and Properties of Chemically Activated Fly Ash Concrete", Nineteenth International Cement Microscopy Association, Cincinnati, OH, 1997.

Silverstrim, T., and Rostami, H., "CAFA: Acid Resistant Concrete for the Twenty-First Century", Society of Protective Coatings, Regional Meeting, Media, PA, 1997.

Physics

- General Physics I, II
- General Physics Lab I, II
- Physics I, II
- Physics Lab I, II

Mathematics and Computer Programming

- Pre Calculus
- Linear Algebra
- Probability and Statistics
- Computer Integrated Manufacturing
- Calculus I, II, III
- Differential Equation
- Computer Programming FORTRAN

PI, Investigation of Mid - Range Refractory Material from Fly Ash, Van Packer Corporation,
March 1997- April 1997 $5,000

PI, Optimization of Chemically Activated Fly Ash, PQ Corp.
March 1997 - January 1998 $25,000

PI, investigation of Green River Fly Ash, FMC Corp.
January 1997 - October 1997 $26,000

PI, Waste Stabilization Using Chemically Activated Fly Ash, U.S. Department of Energy
September 1996 - March 1997 $75,000

PI, Feasibility of a Given Fly Ash for Construction, FMC Corp.
January 1996 - December 1996 $38,000

PI, Application of Chemically Activated Fly Ash Technology to Concrete Vaults, Ben Franklin Partnership
January 1996 - June 1996 $40,000

PI, Development of Chemically Activated Fly Ash, PQ Corp.
September 1995 - January 1997 $25,000

PI, Construction Material from Chemically Activated Fly Ash, Environmental Protection Agency
September 1995 - March 1995 $62,000

PI, Development of Chemically Activated Fly Ash (CAFA) Cementious Material, Ben Franklin Partnership
March 1995 - June 1995 $25,000

Co - PI with Dr. Zandi, Development of Rubber Included Concrete, U.S. Department of Transportation.
June 1992 - June 1994 $300,000

TEACHING EXPERIENCE

GRADUATE LEVEL COURSES

Environmental Geotechnology (Independent Study)
Investigation of wastewater disposal facilities, waste stabilization, subsurface and air flow, soil - contaminant interaction, and remediation investigation and analysis techniques.

Waste Water treatment (Independent Study)
Investigation of contaminated water, methods of clean - up, review of physical, chemical, and biological remediation techniques for contaminated sites and groundwater.

Information obtained from these two independent study courses was basis for proposal submitted and funded by U.S. Department of Energy. To review the abstract, see Appendix A

UNDERGRADUATE LEVEL COURSES

To see description of courses taught refer to Appendix B

Engineering

- Construction Materials
- Graphical Communication
- Dynamics
- Fundamentals of Materials
- Statics
- Mechanics of Materials

Zandi, I, Lepore, J., and Rostami, H."Particulate Rubber Included Concrete Compositions" Patent # 5,454,751, Issued September 15, 1994.

PATENT SALE

Patent # 5,601,643, Chemically Activated Fly Ash Material, UM Holding
October 1997 $1,000,000

LIST OF ALL PENDING PROPOSALS

PI, Innovative Research on Permeable Reactive Barriers, PQ Corp.
January 2003, - September 2003 $75,000

PI - Phytostabilizing Heavy Metal ContaminatedSoils with Fly-Ash Based Zeolites (FABZ), National Science Foundation.
January 2003 - January 2005 $100,000

Co-PI With Dr. Stencel, Removal of Heavy Metals by Alkali Activated Fly Ash (AFA-PRB, U.S. Department of Agriculture.
March 2003 - September 2003 $80,000

FUNDED RESEARCH

PI, Treatmwnt of Textile Wastewater, National Tectile Center.
May 2002 - August 2002 $10,000

PI, Development of Plaster/Fly Ash Material, Ben Franklin Partnership
June 2002 - August 2002 $12,000

PI, Development of sustainable Textile materials, Summer Grant

June 2002-August 2002 $5,000

Co - PI with Dr. Jahanian, Under-Graduate Student Summer Grant, National Science Foundation.
June 2001 - August 2001 $12,000

PI, Basic Research in Fly Ash Utilization, Prudent technology
May 2001 – July 2001 $2,000
Co - PI with Dr. Jahanian, In - Situ Remediation of Contaminated water with Alkali Ash Material permeable Reactive Barrier to Remove Hg and Pb, National Science Foundation.
November 2000 - November 2002 $100,000

PI, Removal of MTBE from contaminated water. Sea Grant
March 2001-June 2001 $7,000

PI, Removal of Heavy Metals from Textile Wastewater Using Reactive Barriers, Summer Grant
June 2000-August 2000 $5,000

PI, Innovative Research on Fly Ash, PQ Corp.
January 2000, - July 2000 $7,000

PI, Removal Of Cadmium and Chromium from Contaminated Water Using Zeotech Reactive Barriers, U.S. Department of Energy.
November 1998, - June 1999 $100,000

PI, Controlled Permeability Chemically Activated Fly Ash for Reactive Barrier, U.S. Department of Energy
September 1997 - March 1998 $75,000

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e-mail: rostamih@Philau.edu

EDUCATION

Ph.D. in Materials Engineering January 1992
Drexel University, Philadelphia, PA
Dissertation Topic:
"Surface Modification of Carbon and Spectra Fibers Using RF Plasma"

M.S. in Mechanical Engineering June 1985
Drexel University, Philadelphia, PA

AREA OF INTEREST

- Large scale utilization of coal ash
- Chemical resistant structures
- Steel rebar corrosion protection
- Mid - range refractory materials
- Removal of heavy metals from contaminated water
- Removal of heavy metals from contaminated soil
- Removal of hydrocarbon from contaminated sites
- Cellular concrete
- Ultra high strength construction materials
- Impact resistant construction materials
- Surface modification to enhance bonding

WORK EXPERIENCE

6/99 - present *Assistant Professor*, Philadelphia University, Philadelphia, PA
Teaching courses in Science and Mathematics. Performing research in reutilization of waste materials such as fly ash. Developing innovative materials to clean contamination from water and soil.

10/97 - 6/99 *Vice President R & D*, ZeoTech Corp., Cherry Hill, NJ
Commercialization of Chemically Activated Fly Ash. Responsible for research and development including testing, laboratory work, and technology transfer activities.

6/94 - 10/97 *Vice President*, By Products Development Corp., Philadelphia, PA
Work on recycling of under utilized materials to produce new materials for the construction industry. Duties include, life cycle analysis, environmental stability, durability and experimental method of evaluating materials performance. Patent # 5,601,643 (Chemically Activated Fly Ash (CAFA) Material) resulted from this work. CAFA technology was utilized to develop ultra high strength construction materials, mid range refractory materials, and cellular concrete. Work was also conducted on development of permeable reactive barrier to remove heavy metals from contaminated water and soil.

1/92 - 6/94 *Post Doctoral Research Associate*, University of Pennsylvania
Surface modification of rubber to adhere to inorganic material. Patent # 5,456,751 (particulate Rubber Included Concrete Composition) resulted from this work.

LIST OF PATENTS

Silverstrim, T., Rostami, H., Larralda, J., and Samadi, A., "Chemically Activated Fly Ash Material", Patent #5,601,643, Issued February 11, 1997.