

Esin and Erdogan Gulari

of Wayne State and Michigan

"Keeping all the balls in the air"

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Dual-career families are becoming commonplace, but the effort required to succeed on all fronts is enormous. Careers as researchers and tenured professors of chemical engineering mean complicated logistics for Esin and Erdogan Gulari in the planning of their daily routine.

For Esin, it means getting up at 6 a.m. to drive the 45 miles from Ann Arbor to Detroit to teach her morning undergraduate class at Wayne State University, returning after teaching her evening graduate class.

For Erdogan, it means preparing their son Bora's breakfast and getting him off to school before going to The University of Michigan to teach his morning class and meet with graduate students.

For both of them it means making sacrifices and juggling schedules and setting priorities. But the Gularis want it all and are willing to work at it.

[Esin's] interest in transport and physical properties of fluids make her one of WSU's leading instructors in transport phenomena, unit operations, and thermodynamics.

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Two outstanding careers in chemical engineering are at least partial evidence that their hard work has paid off.

They received their B.S. degrees in chemical engineering in 1969 from Robert College in Istanbul, Turkey, and were married the following summer. In the fall they began graduate school at Caltech, both choosing Professor Neil Pings as thesis adviser. After receiving their Ph.D. degrees in 1973, Erdogan accepted a postdoctoral fellowship with Professor Ben Chu at the State University of New York at Stony Brook while Esin combined teaching of physical chemistry with research under Professor Chu's direction.

In 1974 the Gularis returned to Turkey, where they accepted positions as Laboratory Manager and Technical Manager of a large vegetable-oil extraction plant along the Aegean coast. They were responsible for the design and construction of a coal- and oil-fired power plant, and were also in charge of the technical operation, which included extraction and refining plants, product control and improvement. Of the experience, Erdogan says, "It taught me how to deal with and manage people. It was an interesting change from being a postdoc to holding a position of responsibility for many people."

But the small town was isolating intellectually,

and when plant construction was finished and start-up problems solved, management of the routine operation did not provide sufficient challenge. So they gave up secure jobs in Turkey in search of positions involving teaching and research in the U.S.

Esin and Erdogan returned to the academic environment at SUNY-Stony Brook and resumed postdoctoral work with Professor Chu in the area of laser lightscattering. In 1978 Erdogan accepted an offer to join the faculty at The University of Michigan. During their first year in Ann Arbor, Esin taught chemistry at nearby Eastern Michigan University. In the spring of 1979 she joined the chemical engineering department at Wayne State University.

ESIN GOES TO WSU

The legend of Esin Gulari at WSU began with an incident that has become an infamous story. During her second interview, just as the faculty had determined that Esin was indeed the scholar and teacher they wanted and were busy convincing her that WSU was the place for her, her car was towed away by the Parking Authority. Was this a warning about the Big City Campus or a sign that WSU would not let her go?

In an incredibly short time Esin has created a laser lightscattering laboratory and built a student research group of a half dozen students actively pursuing research projects. Her students are also welcome in Erdogan's Ann Arbor laboratory whenever additional equipment is necessary.

At Stony Brook, Esin, jointly with Erdogan, developed an inversion technique to evaluate particle size distributions of colloids and polymers from dynamic light scattering data. Her research at WSU now centers on using lasers, "a nonintrusive and precise probe," to study fluctuations in fluids.

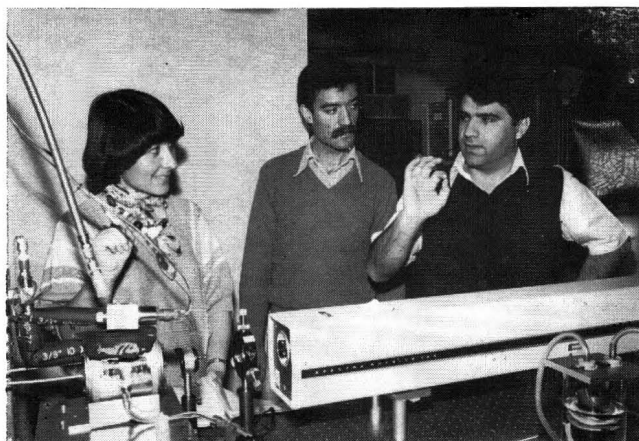
A major focus of her research concerns the diffusion of compressed gases in liquids and medium molecular weight hydrocarbons in dense gases with urgent interest because of the use of CO_2 as a miscible solvent in tertiary-oil recovery and supercritical extraction processes. Esin has been able to use photon correlation spectroscopy to measure the binary diffusion coefficient at elevated temperatures and pressures in these systems. Her group introduced the use of a "probe particle" of known radius for measuring liquid viscosities.

Most recently, she has been concerned with the physical properties of polymeric emulsions. The

average molecular weight and the molecular weight distributions determine the principal physical properties, and hence it is crucial to be able to predict and control the polydispersity of a polymer. Understanding the mechanism of initiation is an important goal of Esin's research. She has demonstrated the existence of at least two competing mechanisms in the polymerization of styrene in microemulsions.

Future research efforts for Esin's group will involve the use of a unique detection scheme of diffraction patterns to characterize diesel sprays.

Esin brings simultaneous dedication to teaching and research. Moreover, she brings enthusiasm and personal qualities which motivate those around her. Members of the WSU faculty who appreciate her sense of humor are in awe of the tough taskmaster image she maintains with her students. She teaches with equal ease at the



Esin and students discuss their latest problem.

undergraduate and graduate levels and has introduced a special graduate course in optical spectroscopy in chemical engineering research. Her interest in transport and physical properties of fluids make her one of WSU's leading instructors in transport phenomena, unit operations, and thermodynamics.

It is obvious that both Esin and her students enjoy their work. Much of her time is dedicated to one-on-one instruction. Even the casual observer cannot help but notice the many hours that graduate students spend in her office and laboratory and their total involvement in her research projects.

Industry recognizes the excellent results Esin achieves. Her students are in demand, and she has a steady stream of visitors examining her laboratory so that they can emulate the equipment. She consults for industry in the Detroit area and also

has visited laboratories in Ludwigshafen, Germany, in collaborative efforts.

There is another facet of Esin's career: service to AIChE. She has served as director, secretary, and was recently elected as vice chairman of the Detroit Section. During her tenure, the Detroit Section has enjoyed some of its most successful years, culminating with the outstanding local Diamond Jubilee Program last year.

ERDOGAN SETTLES IN AT MICHIGAN

For Erdogan, research is not only a scholarly challenge, it's fun. As his graduate students say, coming to the lab "is like coming to play. A new project or a new piece of equipment is like a new toy to him." His enthusiasm is contagious, and his students enjoy their work. Actually, they say, he is as excited about their successes as he is about his own, and he often spends extra hours in the lab sharing their highs (or lows).

Erdogan is happiest tackling new problems rather than doing what somebody else has already done or is currently doing. "Don't reinvent the wheel," and "an hour in the library is worth ten in the lab," he tells his students. His interest in new frontiers led him to research in periodic and unsteady state operation of catalytic reactors.

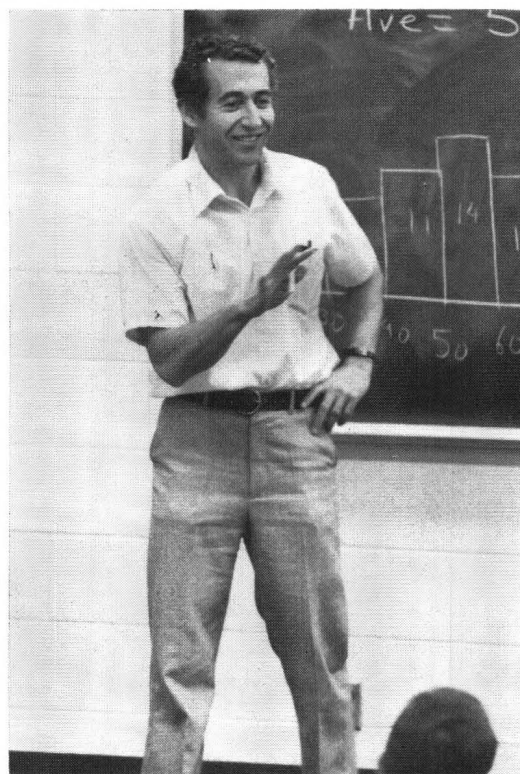
Erdogan's two most significant research accomplishments have been: the establishment of

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dynamic lightscattering as a reliable means of measuring the mutual diffusion coefficient and thermal diffusivity; and with Esin, the development of an indirect inversion technique to evaluate the Fredholm integral of the first kind in order to obtain particle size distributions from dynamic lightscattering data.

He is currently working on unsteady state operation of catalytic reactors and has developed a reactor system that allows investigation of transient phenomena in the millisecond time range.

Erdogan's work in adsorption of sulfonate based surfactants on germanium oxide was the first molecular investigation of surfactant adsorption which clearly demonstrated which functional group was responsible for adsorption, and it showed that the hemimicelle theory of adsorption



Not a conventional teacher, Erdogan enjoys the challenge of the classroom.

was not in agreement with the molecular picture of adsorption.

In order to carry out his research Erdogan first had to build his laboratory—almost from scratch. He has built a spectroscopy lab matched by few across the country, and other investigators now send both their students and their samples for testing to his lab.

Part of the challenge of research is in teaching research. He expects and encourages his students to do their own thinking and experimentation. According to his graduate students, "If you come up with a good idea, you are encouraged to try it out. He is very open-minded and almost never imposes his own way of doing things. He would rather have you try and fail than not try at all."

He believes in students' independence in the laboratory and in the classroom. For that reason Erdogan would not be described as a "conventional" teacher. He often leaves holes for students to fill in on their own, inviting thought and investigation rather than providing every detail for them. But he is very willing to spend time with individuals when they request additional information or guidance.

"One of the rules I try to follow in teaching is to make sure that the students understand

On local waters . . . Professors Gulari are known as Bora's mom and dad. When he was six years old, weighing only 43 pounds, Bora was the youngest windsurfer in the world. He won the championship in the Ann Arbor "B" fleet competition over nine other contenders when he was only seven years old.

that I am there to help and encourage them in their learning process, both on a one-to-one basis and also in the classroom, and that I care about them." In order to better interact with the students, he divides his large classes into small discussion groups where problems can be discussed informally. "My emphasis in these discussion sessions is not just to solve problems or answer questions, but also to get the students to think and arrive at the answer, starting with the most fundamental definitions or equations."

"To me, teaching is more than a requirement of the job. I do not agree with the claim that good researchers make poor teachers." Erdogan is determined to get the material across, even to the largest classes, and he will try new approaches when old ones fail.

FAMILY ACTIVITIES WATER-ORIENTED

Busy teaching and research schedules for husband and wife leave little spare time for the Gulari family. As much time as possible, though, is spent on one of the nearby lakes or rivers. The Gularis are avid sailors. They started sailing as a means of relaxation while writing their theses at Caltech, and Bora tasted the salty spray of the Mediterranean when he was only three months old.

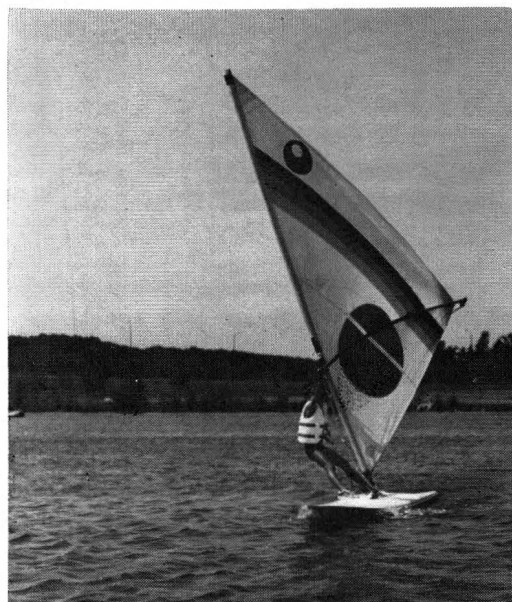
A tribute to Erdogan's sailing abilities came in the fall of 1983 when he was sponsored by the sailboat manufacturer Banshee in the national championships in Alameda, California. He finished second in 1982 and fifth in 1983 in this single-handed mono-hull class.

Recently the Gularis' interests have turned to windsurfing. "I love the freedom and independence windsurfing offers," says Esin. "After work, on a day when the westerly blows, it is very refreshing to feel the board take off and literally fly for an hour." "I especially like to sail in stormy weather," says Erdogan. "While physically demanding, it provides total mental relaxation."

On local waters around Ann Arbor, Professors Gulari are known as Bora's mom and dad. When he was six years old, weighing only 43 pounds, Bora was the youngest windsurfer in the world. He now beats many adults, even on windy days. He won the championship in the Ann Arbor "B" fleet competition over nine other contenders when he

was only seven years old. He has appeared on television news shows, and many regional newspapers have carried articles and photographs. At the age of 8, Bora Gulari has developed into a "big-shot" windsurfer.

Collaboration, yet independence, seems to be a key to the mutual success of the Gularis. They shared the expertise of common dissertation and postdoctoral advisers and have co-authored a



Bora, a champion windsurfer, displays his skill.

number of papers. Sharing the same initials, though, has led to occasional mixups, with Erdogan getting credit for Esin's papers. To minimize the problem and to clearly show their independence in research, they have made special efforts not to work on closely related problems and have not co-authored any papers for the last six years.

Both The University of Michigan and Wayne State University are proud of the professional relationship the two Professors Gulari have fostered between the schools. Chemical engineering in the State of Michigan certainly benefits from this unique sharing of knowledge and ideas. □

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