

RHEOLOGY BULLETIN

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THE SOCIETY OF RHEOLOGY EXECUTIVE COMMITTEE – 2001-2003

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GIUSEPPE MARRUCCI 2003 BINGHAM MEDALIST

The Bingham medal of the Society for 2003 will be awarded at the Pittsburgh meeting to Professor Pino Marrucci of the University of Naples, Italy; a write-up appears inside this issue of the Bulletin.

75th ANNUAL MEETING PITTSBURGH, PA OCTOBER 12 – 16, 2003

The 75th Annual Meeting of the Society of Rheology will be held at the Sheraton Station Square Hotel in Pittsburgh, PA. The hotel is located opposite the confluence of the Ohio, Allegheny and Monongahela rivers and the central "Golden Triangle" of Pittsburgh.

As usual, the Meeting will begin with a reception in the Hotel on Sunday evening, with presentation of the Bingham Award at a dinner on Tuesday. The Technical Program will include sessions on Biorheology, Entangled polymers and analytical rheology, Suspensions and multiphase fluids, Liquid crystalline polymers, self-assembling fluids, and nanomaterials, Viscoelastic flows and instabilities, and the Rheology of solids and near-solids. Registration and housing forms may be found on the web site of the Society at www.rheology.org, while attractions in the Pittsburgh area, many easily reached from the hotel, may be found on the web site at www.Pittsburgh.net.

The meeting organizers are:

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2003 BINGHAM AWARD GOES TO GIUSEPPE MARRUCCI

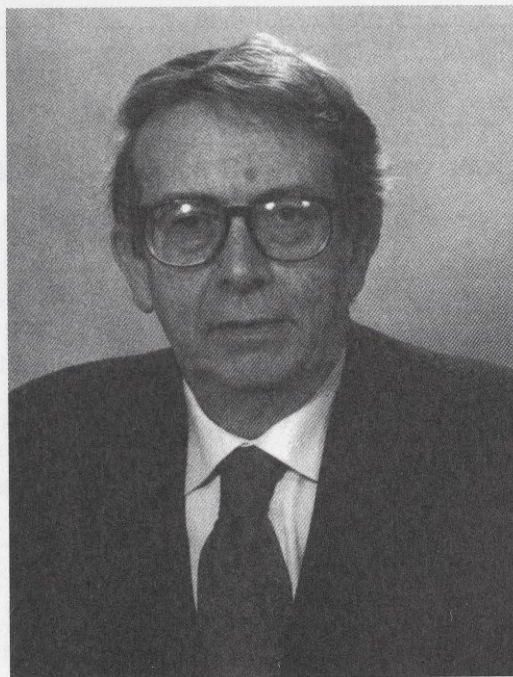
Giuseppe (Pino) Marrucci has been selected as the 2003 Bingham Medalist. This choice is completely unsurprising, given the extraordinary breadth and depth of Pino's contributions to the science of rheology. The choice will also delight the community of rheologists, whom Pino has served in so many ways over his very distinguished career at the University of Naples.

The scope of Pino Marrucci's contributions to rheology can perhaps best be appreciated when one recognizes that his contributions in each of several areas would qualify him as one of the world's most eminent rheologists.

Entangled Polymers Since the introduction of the seminal Doi-Edwards theory in 1978, the two most important advances to this theory for the rheology of flexible-chain polymers have been due to Marrucci and coworkers. The first advance, in the early 1980's was the addition of "chain stretch" to the basic equations. Chain stretch permits overshoots in normal stresses to be predicted. This improvement did not, however, cure the most severe, and well-known, deficiency of the famous Doi-Edwards theory, which predicts too much shear thinning. Recently, however, Marrucci introduced the concept of "convective constraint release" (CCR), which repairs this final, major, problem in tube models for fast flows of linear polymers. Marrucci's "convective constraint release" concept has led to a flurry of activity and has rejuvenated this field. Apart from the original development of the Doi-Edwards equation, this contribution is probably the most important idea in the entire field of constitutive equations for melts of flexible polymers.

Marrucci has made numerous other contributions to our understanding of the rheology of entangled melts. These include his invention of the concept of "dynamic dilution" in the early 1980's, which was applied to star polymers by Ball

and McLeish in 1989. This, along with primitive path fluctuations (introduced by de Gennes), is the key concept required to understand the rheology of branched polymers. Another very recent contribution is the idea of a "local force balance" between entangled polymer molecules; this concept seems to be the key to performing some dynamic simulations of entanglement networks, and may be responsible for controlling the magnitude of the second normal stress difference.



Professor Giuseppe (Pino) Marrucci

Liquid Crystals and Liquid Crystalline Polymers In 1989, Marrucci and Maffettone explained the cause of the mysterious negative first normal stress difference in shearing flows of nematic polymers. The explanation involved director tumbling, by which shearing flows actually cause the molecules to be less aligned than in the absence of shear, producing a reactive force that is the opposite of the usual, giving rise to negative N_1 . This solution required a deep understanding of the dynamics of liquid crystalline polymers, and combined with their numerical solution to the Smoluchowski equations for the distribution function for liquid crystal orientations, produced a convincing prediction and explanation of negative N_1 . This work was probably the single most important discovery in the theoretical study of liquid crystalline polymers, and it led to many further developments in this field involving the concept of director tumbling.

In the early 1990's, Marrucci and Greco developed a theory for the structure of a defect core that can be applied to flowing liquid crystals. When combined with the "Doi theory" for

MINUTES OF THE EXECUTIVE COMMITTEE MEETING April 13, 2003

nematic polymers, this theory allowed the development of numerical solutions for the director field in flowing liquid crystals, and it has been widely used for that purpose. Marrucci made many other contributions to liquid crystal flow, including the widely-cited "Marrucci scaling law" for the density of disclinations as a function of shear rate, estimates of the magnitudes of viscous stresses in flowing liquid crystalline polymers, a "nematic dumbbell" model that explains why nematics with flexible spacers do not show director tumbling, and a theory for the effect of polydispersity on the rheology of concentrated rod-like polymers.

Constitutive Equations and non-Newtonian Fluid

Mechanics In addition to the above-cited contributions to the molecular physics of rheology, Marrucci has never lost sight of the importance of rheology as an engineering discipline. Marrucci has produced numerous simplified constitutive equations, useful for calculating the stresses in complex flows. These equations include a simplified differential version of the Doi-Edwards equation, equations that improve the normal-stress predictions of that equation, equations for liquid-crystalline polymers, associating polymers, and others. Not to be ignored are Marrucci's collaborations with Mort Denn, which include analyses of filament breakup and of the rheology of suspensions. In the 1970's, Astarita and Marrucci contributed a wonderful book on rheology, perhaps the most lucid work on the subject available at the time.

Dilute Polymer Solutions In a 1970's paper, much in advance of its time, Marrucci and coworkers used molecular simulations to discover the importance of folded conformations in the extensional flow of dilute polymer solutions. The simulations were rather primitive compared to those now possible, but Marrucci must be acknowledged as the first to observe these conformations, whose significance only became apparent as a result of the DNA imaging work of Steve Chu and coworkers. Also early in his career, Marrucci contributed an expression for the free energy of a deformed polymer chain that has since become a mainstay of polymer thermodynamic analyses.

Service to the Rheological Community Pino's service to our community extends well beyond his scientific contributions. He has regularly hosted or co-hosted rheology meetings, including three delightful meetings on the island of Capri near his beloved Naples University and the International Congress on Rheology in Naples. Pino is a wonderfully clear communicator and a spirited participant in our beloved international community of rheologists. His contributions are always marked by a rare combination of intelligence and grace. Pino is a mainstay of our discipline.

Ron Larson

Bill Russel called the meeting to order at 8:21 a.m. in the TriState Room of the Four Points Hotel near Chicago O'Hare Airport in Schiller Park, Illinois. Committee members in attendance were Susan Muller, Lisa Mondy, Monty Shaw, Jeffrey Giacomini, Gerry Fuller, Mort Denn, Don Baird, Bill Russel, and Bob Powell. Invited guests were Andy Kraynik, Janis Bennett, Savvas Hatzikiriakos, Rakesh Gupta and Faith Morrison. The minutes of the previous meeting were read and approved with one amendment: to insert "by" after the comma in the last sentence on p. 3.

Faith Morrison, Chair of the Membership Committee, reports that as of April 3, 2003, 62% of our paid members are domestic, 38% foreign. At year end 2003, we had 1626 members (1333 regular, 216 student, 38 retired, 12 of record and 27 Society of Physics Students (Undergraduates)). This is down from 1703 at year end 2002.

Mort Denn, Editor, reported that the *Journal of Rheology* is healthy. Articles over the period April 10, 2002 – April 9, 2002 number 178 submitted, 56 accepted, 70 rejected, 1 withdrawn and 51 pending. Mean time for acceptance was 134 days; mean time for rejection, 42 days.

Monty Shaw then presented the Statement of Revenues and Expenses for The Society of Rheology and for its *Journal of Rheology*. The financial position of the Society is sound. The Minneapolis meeting and the corresponding short course were both significantly profitable. The Executive Committee passed a motion to accept these reports. Giacomini, Editor for Business, reported on the *Journal of Rheology On-Line (JOROL)* which now receives over 15,000 requests per month from over 1,600 unique hosts, downloading articles roughly 2,000 times. Of the roughly 2,500 JOR articles on-line, about 1,000 different articles are downloaded each month.

The Executive Committee unanimously passed a motion to extend the student travel grant from 3 to 4 nights in the conference hotel. On behalf of the Education Committee Chair Norm Wagner, Susan Muller led a discussion about future short courses. On October 11-12, 2003, the weekend preceding the upcoming Pittsburgh meeting, the two-day short course "Rheology and Micro-rheological Measurements of Associating Complex Fluids" will be taught by Bob Prud'homme, Bill Russel and James Harden.

Rakesh Gupta, outgoing Editor of the *Rheology Bulletin*, led a discussion about the Bulletin. The editorship will transfer to Faith Morrison following the July 2003 issue. The executive committee enthusiastically passed a motion to thank Rakesh Gupta for his selfless editorship of the *Rheology Bulletin* since December 1994.

Janis Bennett led a discussion on the Society's liaison with AIP. Bennett reports that the Niels Bohr Library at the American Center for Physics in College Park, Maryland

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- Torque rebalance transducer
- Digital sampling technology
- Entry Level & Research Grade instruments
- Stress relaxation
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archives a complete collection of the *Rheology Bulletin* and of the Abstract of the Annual Meetings.

The meeting was adjourned at 12:15 pm. In the subsequent Executive Session, a motion then passed to accept the recommendation of the Bingham Award Nomination Committee and to award the 2003 Bingham medal to Professor Pino Marrucci at the upcoming meeting in Pittsburgh.

The meeting reconvened at 1:30 pm with Rakesh Gupta, for Guy Berry, Chair of Local Arrangements, reporting on the Pittsburgh meeting, to be held in the Sheraton Station Square Hotel (October 12-16, 2003). Everything is in order.

Savvas Hatzikiriakos, Chair of Local Arrangements, gave a presentation on the October 16-20, 2005, meeting of The Society of Rheology in Vancouver, Canada.

Andy Krainik, Chair of the Ad-Hoc Committee on the ICR 2008, reported on the 2008 International Congress on Rheology. By the new ICR rules, this meeting must take place in the Americas. After carefully considering three proposals, the committee chose Monterey. The committee then recommended that the Executive Committee put Monterey forth as The Society of Rheology proposal to the International Committee to host the ICR in August 2008. The Executive Committee unanimously approved this recommendation. This would also serve as the Annual Meeting of The Society of Rheology in 2008. The Executive Committee passed a motion to thank Andy Kranik and his Ad-Hoc Committee for their hard work on the selection process.

The meeting was adjourned at 3:12 p.m.

HOLMES RESPONDS TO PRESIDENT RUSSEL

"Well Watson! What is it this time? Another 100 points off the stock market?" exclaimed my friend seating himself beside the single ring of the gas fire that economy had forced upon me. Why is it that the fellow is always so confounded cheerful when the news is so bad?

"Nothing so trivial," I assured him. "It seems as though my subscription to **the** Journal is set to rise to \$500 a year - the same as libraries have to pay. Of course I can see the ethical justice - why should public bodies be expected to subsidise private citizens. But this seeming triumph for democracy will undoubtedly sever the last links that I have with my scientific past. The Journal may well be worth \$500 a year - but that is twice what we spend on the malt whisky that you insist on researching to discover the 'key to eternal life'. In short Holmes, we are doomed!"

The great detective solemnly perused the tear-stained copy of *Rheology Bulletin* 72 (1) that I handed him. His face grew increasingly serious. Finally he laid the "Report of the President" aside, lit his pipe with a spill from the fire - in such circumstances I could forgive the lapse from grace - and declared: "There is one solution. The Editor must cut his costs. For a start, he should cease the overgenerous payments that he is undoubtedly disbursing for articles and reviews."

"Alas, Holmes," I countered. "No such savings can be made - the Editor makes no such payments."

"It is as I thought," observed Holmes switching on a second bar and driving off the winter chill that was beginning to seize my weary bones. "There is no need for this economy! But first tell me - would the libraries want to purchase the Journal if there were no articles and they were not properly reviewed?"

The vigorous shaking of my head must have been all the answer he needed for he continued: "And who are the people who give freely of their time to prepare contributions and reviews to ensure the quality and value of the Journal?"

"Why Holmes, overwhelmingly they are members of the Society." Slowly the light dawned. "Obviously, the Society only elects to membership those whom it expects to contribute to its meetings, publications and other activities and there is no ethical compromise in their receiving the Journal at highly advantageous rates - or indeed **FREE!**"

(The above exchange was related to the Editor by Dr. F.N. Cogswell).

CANDIDATES FOR SOCIETY OFFICE

The three-member Nominating Committee, consisting of Guy Berry, Ralph Colby (chair) and Paula Moldenaers, has prepared the following list of candidates:

President	Susan J. Muller
Vice President	Gary Leal Robert Prud'homme
Secretary	A. Jeffrey Giacomini
Treasurer	Montgomery T. Shaw
Editor	Morton M. Denn
Members-at-Large	Wes Burghardt Bob Butera Nino Grizzuti Tim Lodge Lynn Walker

Voting will be done by electronic ballots at www.rheology.org/sorvote/. This web site will be turned on about July 25, 2003.

EDITOR BIDS ADIEU!

Rakesh Gupta, Editor of *Rheology Bulletin* since 1995, is stepping down to pursue other adventures. The next issue of the Bulletin, and subsequent issues, will be edited by Dr. Faith Morrison of Michigan Technological University. She may be reached via e-mail at fmorriso@mtu.edu.

Reflections on the 75th Anniversary of the Founding
of
THE SOCIETY OF RHEOLOGY

Kurt F. Wissbrun
Society President from October 1995 to October
1997

The Editor of the Bulletin, perhaps under the mistaken impression that I was present at the founding, has asked me to write some personal reflections on The Society of Rheology on the occasion of the upcoming 75th Anniversary of The Society. The obvious questions are "What has changed? What has remained constant?", both quantitatively and qualitatively". There is not sufficient space here to review year by year the history of The Society, so I have chosen to consider four years of particular significance, as follows:

- 1929 the year of the founding, and of the publication of the original *Journal of Rheology*
- 1957 the year that I joined The Society and attended my first meeting, and of the publication of Volume 1 of the *Transactions of the Society of Rheology*, the predecessor of our present *Journal*
- 1990 the year that The Society took over the publication of the *Journal of Rheology* from the commercial publisher

2003 the present

I begin with the quantitative aspects, which are based on available data, and are easiest to assess objectively. The statistics in Table 1 show that the Society has grown significantly from its modest beginnings to the present day. Three obvious measures of that growth are the number of members, the number of journal pages, and the financial assets of the Society [Rows 1, 8, 17].

The growth of the assets is directly related to the success of the Journal, whose modern history, from its beginning as the *Transactions of the Society of Rheology* in 1957, is shown in Figure 1. The Journal grew slowly but steadily until 1988. In the next two years a large jump of the page count precipitated a crisis, because the agreement with the then publisher required the Society to make substantial payments for pages in excess of a fixed limit. The choice under that agreement was then to limit the pages published or to increase the dues significantly to pay for the excess pages. Under the leadership of President John Dealy, and with the assistance and encouragement of AIP, the Society took what many felt to be a bold leap into the unknown by taking over the publication. The record since shows that this move has been an unalloyed success. The number of pages has increased dramatically, and there is no financial constraint on the Editor to limit publication.

TABLE 1

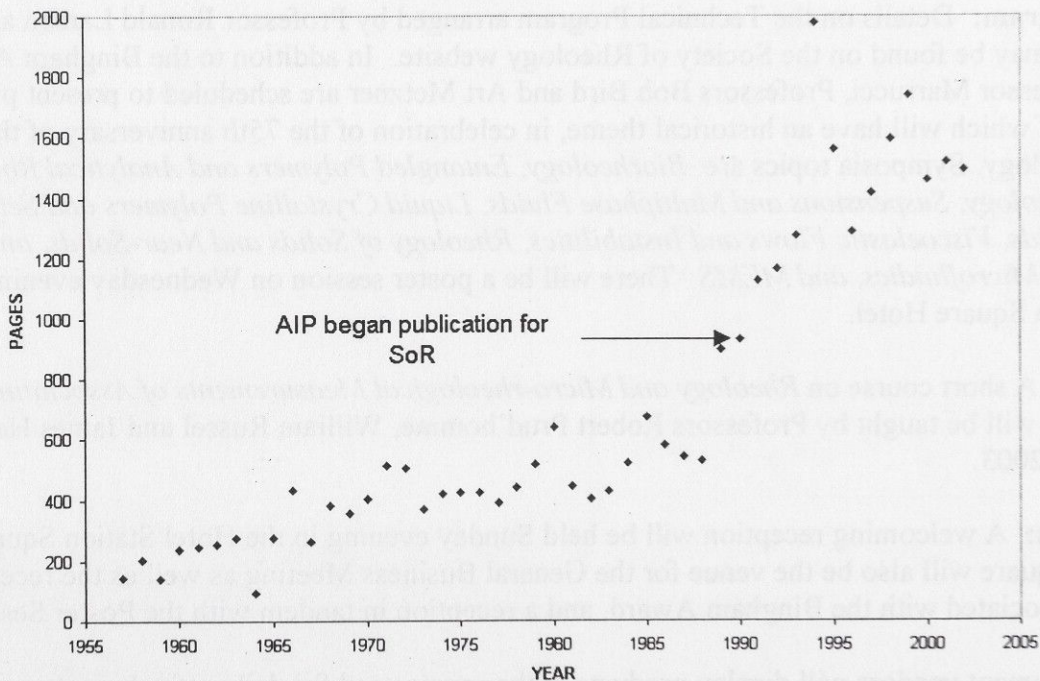
ROW	YEAR(S)	1929-31	1957	1990	2002
1	No. of Members	78-204 ¹	~400 ²	1086 ³	1619 ⁴
2	Fraction Indust. & Research Institutions ⁵		0.65 0.12	0.41 0.08	0.36 0.08
3	Fraction Foreign Members ⁵		0.09	0.23	0.38
4	Fraction ⁶ Ind.&Inst. Journal Papers	0.19 0.13	0.27 0.37	0.13 0.20	0.11 0.12
5	Fraction Foreign Authors ⁶	0.29	0.02	0.30	0.54
6	Meeting Attendance	80	93 ⁷	~300	~350
7	No. of Papers	26	28	174	203
8	Journal Pages	375 ⁸	222	1310	2298 ⁹
9	No. of Journal Papers	68 ⁸	16	61	74
10	Nonmember Subscribers			~600 ¹⁰	~375 ¹⁰
11	Annual Dues	\$3 ⁸	\$4 ¹¹	\$40	\$40
12	Nonmember Subscription	\$5 ⁸	\$6	\$290	\$550
13	Cost per Page ¹²	\$0.078	\$0.096	\$0.169	\$0.133
14	Registration Cost	\$2 ¹³	?	\$80	\$120
15	Income	\$6239 ¹⁴	\$1600 ¹⁵	\$280,000	\$341,000 ¹⁶
16	Expense	\$6016	\$2370 ¹⁵	\$84,00	\$327,000 ¹⁶
17	Assets	-	\$2520 ¹⁵	\$311,000 ¹⁷	\$853,000 ¹⁶

NOTES:

- 1) Range from 1932-1944 [Survey by R.B. Dow, Sec'y.-Treas., in AIP archive]
- 2) August 1958 roster [AIP archive]
- 3) 1989 Membership Directory
- 4) Victoria Gentile, AIP, via Faith Morrison
- 5) Estimated from 60-70% of membership with institutional affiliation identified
- 6) Vols. 1-3 (1929-31), 68 papers; Vols. 1-3 (1957-59), 41 papers; Vol. 34 (1990), 61 papers; Vol. 46 (2002), 74 papers
- 7) 1956 Meeting [Rheology Bulletin, Vol. 26, No. 1, Jan. 1957]
- 8) Journal of Rheology, Vols. 1-3 (1929-31)
- 9) Actual pages 1487, but for comparison with earlier issues normalized by factor of 1.545 to account for larger print area introduced with Vol. 37
- 10) Monty Shaw
- 11) Estimated from number of members and estimated 1957 income [Rheology Bulletin, Vol. 26, No. 1, January 1957]
- 12) Normalized for page size AND Consumer Price Index [1929: 17.1; 1957: 28.1; 1990: 130.7; 2002: 179.9]
- 13) Program of 3rd Annual Meeting, 1931 [AIP Archive]
- 14) Includes \$4,400 contribution from The Chemical Foundation
- 15) Estimates in Rheology Bulletin, Vol. 26, No. 1, Jan. 1957
- 16) Projections, Rheology Bulletin, Vol. 72, No. 1, Jan. 2003
- 17) Compared to \$147,000 at end of 1989 [Rheology Bulletin, Vol. 59, No. 1, Jan. 1990, Vol. 61, No. 1, Jan. 1992]

Fig. 1

Normalized Pages of JoR



(Continued on Page 11)

MEETING INFORMATION

The Society of Rheology 75th Annual Meeting with Short Course
October 12-16, 2003, The Sheraton Station Square Hotel, Pittsburgh, PA

For more information: Detailed information about the meeting, lodging, registration, and travel can be found on the Society of Rheology website at <http://www.rheology.org/sor/> under the heading *Meeting Announcements*. The website should also be consulted to submit abstracts, and, at a later date review the technical program for the meeting, as well as for registration forms and up-to-date information on the meeting arrangements.

Registration: The registration fee includes access to all technical sessions and the vendor display, the program and abstract booklets, two receptions, coffee breaks, and refreshments at the poster session. The registration fee does not include the Bingham Award Banquet. The fee for the banquet is \$55. Registration instructions, forms and fees appear on the Society website.

Location: Technical sessions and the short course will be held at the **Sheraton Station Square Hotel**, a modern full-service hotel located in Station Square, opposite the confluence of the Ohio, Allegheny and Monogohaila Rivers and the central "Golden Triangle" of Pittsburgh. A variety of restaurants and shops may be found in the Golden Triangle and the Station Square complex. For on-line information about Station Square area, go to <http://www.stationsquare.com>. For on-line information about the city of Pittsburgh and environs, including sites of interest, accommodations, transportation, etc., click go to <http://www.pittsburgh.net/>. For on-line information about the many activities in Pittsburgh, including a calendar of events, and info on sight seeing and entertainment attractions, go to <http://www.carnegielibrary.org/subject/pgh/>.

Technical Program: Details on the Technical Program arranged by Professor Ronald Larson and the Session Chairs may be found on the Society of Rheology website. In addition to the Bingham Award Lecture by Professor Marrucci, Professors Bob Bird and Art Metzner are scheduled to present plenary lectures, each of which will have an historical theme, in celebration of the 75th anniversary of the Society of Rheology. Symposia topics are: *Biorheology, Entangled Polymers and Analytical Rheology, Extensional Rheology, Suspensions and Multiphase Fluids, Liquid Crystalline Polymers and Self-Assembling Fluids, Viscoelastic Flows and Instabilities, Rheology of Solids and Near-Solids, and Microrheology, Microfluidics, and MEMS*. There will be a poster session on Wednesday evening in the Sheraton Station Square Hotel.

Short Course: A short course on *Rheology and Micro-rheological Measurements of Associating Complex Fluids* will be taught by Professors Robert Prud'homme, William Russel and James Harden on October 11-12, 2003.

Social Program: A welcoming reception will be held Sunday evening in the Hotel Station Square. The Hotel Station Square will also be the venue for the General Business Meeting as well as the reception and Banquet associated with the Bingham Award, and a reception in tandem with the Poster Session.

Exhibits: Instrument vendors will display products in the rooms used for daily refreshments and the Poster Session.

Accommodations: Rooms are reserved at Sheraton Hotel Station Square at a conference-price, on a first-come, first-served basis for a conference rate. For information contact: Sheraton the Hotel Station Square, 7 Station Square Dr., Pittsburgh PA 15219, 412-261-2000, Fax:412-261-2932. Please mention the Society of Rheology meeting to obtain the conference rate at the Sheraton Hotel. Hotel reservations should be made directly by the participants, and neither the arrangements nor the cost is the

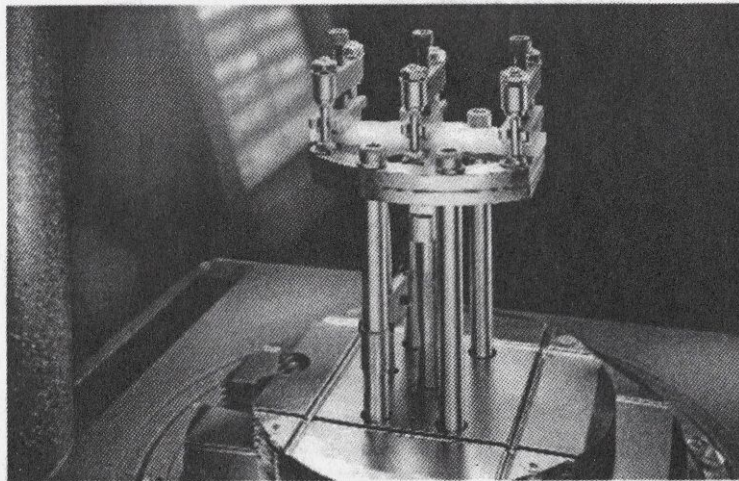
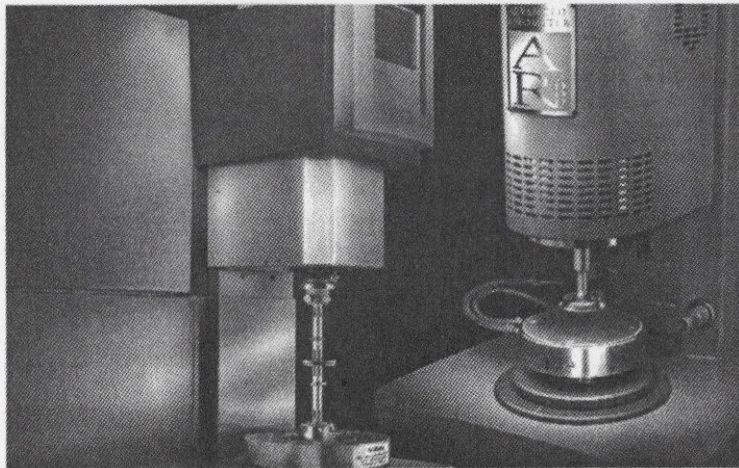
responsibility of the Society of Rheology. Additional hotel space may be found in nearby downtown Pittsburgh over a range of accommodation style and price. For information on the hotels listed in the on-line information on Pittsburgh, visit: http://www.pittsburgh.net/visitor_information.cfm.

Transportation: Pittsburgh is served by the Pittsburgh International Airport, which offers direct flights to most major locations in the USA and Canada, as well as direct flights to several locations in Europe. The conference site at Station Square (about 15 miles from the Airport) may be reached by direct limousine service from the airport operating hourly, by limousine service to downtown Pittsburgh operating more frequently, coupled with a short taxi ride to Station Square, or by taxi from the airport. Visit the travel information booth near baggage claim at the Pittsburgh International Airport.

Driving Instructions: From Airport: Follow airport signs to Pittsburgh. Exit the Parkway at EXIT 7B, West End By-Pass, to arrive on Carson Street. Station Square will be on the left after a short distance. From I-79: Follow the signs to Pittsburgh Exit Eastbound, and then follow the preceding directions. From I-376 Westbound: Follow the signs to Pittsburgh via Exit 6, Monroeville, to I-376 Westbound. Exit at Grant Street, immediate left at traffic signal, one block to left on Smithfield Bridge to Station Square.





For additional information on the local arrangements, please consult the website of the Society of Rheology, or if the information you seek is not found there, contact G.C. Berry, e-mail: gcberry@andrew.cmu.edu.

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The financial success of the publication came as a pleasant surprise. It was evident in the first year of the take-over. The Society's assets of \$147,000, slowly and painstakingly amassed by the diligent stewardship of Treasurer Ed Collins and his predecessors, more than doubled in the first year of the Society becoming the publisher. The financial success has been of great benefit to the members in numerous ways. Dues have not been required to increase, and the Journal no longer demands page charges for publication. The Publication Reserve fund enabled us to take the financial risk of creating the CD-ROM of Vols. 1-41 of the Journal, which is now also available on-line to Nonmember subscribers. And although the Nonmember subscription price has been increased, the cost per page has actually decreased, and there is no additional charge for on-line access to the Journal. The magnitude of the financial assets of the Society has provoked considerable, and sometimes heated, discussion among the membership. President Russel addressed the issue in the previous issue of the *Bulletin*, and I will add some comments further on.

Now I address the qualitative aspects of constancy and change of the Society. First and foremost is of course the mission of the Society. A good place to start is perhaps Article II (OBJECT) of the original Constitution of the Society. This was published in the 1929 Vol. 1, No. 1 of the original *Journal of Rheology*, which was reprinted and distributed to the attendees of the 50th Annual Meeting. For the benefit of those not present there I copy it here:

The objects of this SOCIETY shall be the advancement of fundamental and practical knowledge concerning the deformation or flow of matter, hereafter designated as rheology, and its connection with various other properties or applications of properties to industry. The objects shall be promoted (a) by meetings at a special time and place, the time and place to be determined at least one year in advance by vote of the Executive Committee, the meeting places not to be determined by national boundaries; (b) by the publication of a journal designed to increase and disseminate knowledge of Rheology and to promote its application; and (c) by other appropriate means.

How successfully has the Society met its objects? In Table 2, I have I have tabulated an analysis of the subjects of papers published in the Journal in the four "significant" years and one additional. (The classification used in this analysis forces each paper into a single category, and is intended to capture gross trends; a more detailed analysis should be multidimensional, perhaps relying on AIP's "Physics and Astronomy Classification Scheme" [PACS]). The papers concerned with "rheometry" and with "theory" clearly address the point of fundamental knowledge of rheology. Understandably, rheometry in particular was the subject of much of the research in the early years of the Society, but it has remained a significant, if not dominant, interest throughout the history of the Society. Considering the materials that have been studied, it is clear that "solids" (including granular material, crosslinked rubber, etc.) were studied in the earlier years, but have now virtually disappeared from the Journal. "Flow", not "deformation" appears to be the principal theme of Rheology; perhaps this situation is prefigured by the motto "παντα ρει" which appears on the cover of the 1929 Journal.

The titles of many of the papers in the 1929-31 Journal clearly indicate the interest in practical knowledge and industrial applications indicated in the Constitution. Soil pastes, paper coatings, greases and oils, pastes and doughs, protective coatings, protoplasm, silver foil, and wiping solders were among the materials studied. The classification of Technical Abstracts, which were also published in the Journal at that time, were "Asphalt, Pitch; Ceramic Materials, Lime, Cement; Lubricants; Paints, Oils, Varnish, Lacquers and Plastics; Rubber", clearly also another indication of interest in applications of rheology. Another indication of strong industrial participation in Society activities are the large proportion of papers originating from industrial and research institution laboratories (0.19 and 0.13, respectively); the relatively high fraction from academic institutions is biased perhaps by the large number of papers from Bingham and his colleagues. Also, only three of the 14 Associate and Assistant Editors of the Journal had academic affiliations. And, of the 10 Presidents of the Society from 1929 to 1957 only two came from academia.

Table 2

YEAR(S)	1929/31	1957/59	1972	1990	2002
RHEOMETRY	0.29	0.14	0.12	0.12	0.09
THEORY	0.28	0.32	0.19	0.21	0.11
FLUIDS	0.30	0.16	0.05	0.24	0.31
POLYMERS	0.02	0.32	0.60	0.44	0.46
SOLIDS	0.11	0.07	0.05	0	0.03

Vols. 1-3 (1929-310, 68 papers; Vols. 1-3 (1957-59), 41 papers; Vol. 16 (1972), 43 papers; Vol. 34 (1990), 61 papers; Vol. 46 (2002), 74 papers

In 1957 the industrial component of the Society was still of major significance. 77% of the members were affiliated with industry or with non-academic research institutions (e.g., NBS, Franklin Institute, etc.), and 64% of the publications in 1957-59 came from those sources. By 1990 those percentages had dropped to 49% and 33%, respectively, and by 2002 had decreased even further to 44% and 23%. The reason for these trends is, I believe, to be related to the variation in the number of papers on the rheology of polymers. The growth of the synthetic polymer industry from the 1930's on led to a need for rheological information, for molecular characterization, for process control, for processing behavior, and for end-use property determination. Industrial scientists and engineers concerned with these needs turned to, and found, in the Society a place to learn from and teach to their colleagues the many new discoveries in experimental polymer rheology. At the same time, I believe, their needs inspired the tremendous advance in the understanding developed largely by academic rheologists that has led us to where we are today, with a sophisticated ability to predict the effects of molecular weight distribution and of long-chain branching, and even to incorporate the predictions in process simulations.

However, this golden age of polymer rheology research may be coming to an end. The fraction of polymer-related articles in the Journal probably went through a maximum some time in the 1970's; I have chosen 1972, when this fraction was 60%, as a year to sample this trend. There are various possible reasons for the decline from the maximum. One is that as fundamental problems were solved, papers on applications such as to processing, found homes in publications of other societies, such as the Society of Plastics Engineers and the Polymer Processing Society. A more worrisome reason, one beyond the control of the Society, is the maturation of the synthetic polymer industry and the decline of industrial research. The decreased fraction of industrial membership is most likely caused by this decline.

The decrease in the fraction of polymer related papers has been compensated for by an increase in the fraction of papers dealing with inhomogeneous and complex fluids, such as suspensions, foams, and biological materials. In a sense this trend brings the subject materials of rheological interest closer back to those of the start of the Society in 1929. This renewed interest in complex fluids is encouraging for the future of the Society. Nevertheless, I am concerned with the relative decline of industrial participation. The founders of the Society felt strongly enough about the industrial application of rheology to stress it in the above-quoted Article II of the Constitution. My own experience, some thirty years later, confirmed their wisdom, at least in the direction of the utility of rheological understanding to industry. The theoretical developments of which we are justly proud would largely not have been initiated, I believe, without the interaction in the Society, of the theoreticians with the problems brought to their attention by their industrial colleagues. And this model, so fruitful for polymer rheology, should be equally applicable to that of other materials.

The Society has no control over the future of industrial polymer research. It does have, however, the ability to attract the interest of other technologies in the application of rheology to their problems, and to learn about new problems to tackle. I don't know which these technologies may be, and whether buzzwords like microfluidics or nanotechnology are relevant in this context. It should also not be forgotten that older technologies, such as foods or oil recovery, still have unsolved rheological problems. One positive step that the Society can take to attracting new industrial interest in rheology is by inviting speakers from these industries to give plenary talks or to organize symposia at our annual meetings, where they can reach a wide audience. Invited review papers for the Journal may be another mechanism to introduce new problem areas to our members.

Another significant aspect of the Society's history is its international character. The very name, The Society of Rheology, without any national characterization, is significant. The Organizing Committee consisted of 23 members, of whom 12 were European, including such well-known names as Brillouin, Ostwald, Prandtl, and Reiner. Twenty-nine percent of the papers in the Journal of 1929-31 had "foreign" (short for non-North American) authors. And Article II of the Constitution explicitly states the "meeting places not to be determined by national boundaries". The international flavor evidently diminished over the years, with only 9% foreign membership in 1958. However, it has had a strong resurgence - in 2002 it constituted 38% of the membership and contributed to 54% of the publications. The recent adoption of a new Constitution erased the one residual vestige of nationalism, the restriction of the Bingham Medal to those from North America. And we have had our first member of the Executive Committee from other than North America. These observations reinforce the appropriateness of the designation "The Society". I hope that the internationalization continues, especially with regard to having more participation by our overseas membership in the governance of the Society.

Perhaps the most important aspect of the character of the Society is that it is, and always has been, a volunteer organization, run by the members, without a paid staff. And evidently there has never been a shortage of volunteers, not only to serve as Officers or members of the Executive Committee, but also to serve on the various committees needed to organize meetings and short courses, to select medallists, to deal with membership and constitution issues, to edit the Journal and the Bulletin, and to referee papers and advise the Editor. This is not only a tribute to the members but also an indication of the worth of the Society's activities to the members. (It must be pointed out that in part we have been able to function as such a volunteer organization because we can rely on AIP for many necessary functions, in addition to its invaluable role in publishing the Journal.)

On the other hand, our status as a volunteer organization limits the number of the Society's activities. For instance, to organize more meetings, regional, topical, or joint with other societies, on an ongoing basis would probably require the

existence of a permanent staff. Other projects that have been suggested over the years, such as production of educational or historical videos, also would take more time and effort than could be expected from a volunteer organization. Although this circumstance has been frustrating at times, it is probably consonant on the whole with the desires of the members. The membership is content with a society that has one excellent meeting a year, at a very reasonable price, produces an outstanding journal and an informative bulletin, and offers a well-attended short course. The underlying reason for this circumstance became clear to me when I was active in the governance of the Society; I was interested and amused to find it expressed very well in a typescript "A Brief Survey of Membership", written in 1944 by R.B. Dow, then the secretary-Treasurer of the Society, that I became aware of while preparing this article. I quote:

"From the beginning the position of the Society among other scientific societies has been unique in that the membership includes many distinguished scientists and engineers who are also active in other societies more closely related to their professions, or which represent the branches of science in which they took their academic degrees."

(Dow also makes a case in this article for the Society to pay attention to the dissemination of rheological principles and applications to other technologies.)

Finally, I wish to express briefly my personal views on the present state and future of the Society's financial assets. Although the present fund appears large, I believe that it is no more than a prudent reserve to cushion the Society against dramatic changes in the finances of scientific publishing; the bankruptcy of several subscription agencies is a sobering reminder of the need for a cushion. It should ensure that we will be able to continue publishing all high quality submissions to the Journal, without constraining the Editor's decision by financial considerations, and that we will be able to continue producing a refereed archival product. We should be prepared to maintain the nonmember subscription price at its present low cost/page, and to absorb additional costs by a modest increase of the dues if necessary. The reserve funds are also useful safeguards against financial problems that could occur in uncertain times, such as external events causing cancellation of a meeting. And, as mentioned above, they can permit the risk of desirable new ventures, such as we took in producing the CD-ROM, and of increased travel costs for overseas Officers and Executive Committee members.

Acknowledgements

I wish to thank Rakesh Gupta for asking me to write these reflections, and for his devoted service as Editor of the Bulletin. I am grateful to Janis Bennett and Sandra Johnson for their assistance in retrieving very helpful material from the

Niels Bohr Library of AIP, to Faith Morrison and Montgomery Shaw for useful information from their records, and Art Metzner and Morton Denn for very helpful comments. Kurt Wissbrun

FUTURE MEETINGS OF THE SOCIETY

76th Annual Meeting
Lubbock, Texas
February 13-17, 2005

77th Annual Meeting
Vancouver, BC, Canada
October 16-20, 2005

78th Annual Meeting
Portland, Maine
October 8-12, 2006

SHORT COURSE AT PITTSBURGH

A two-day short course on Rheology and Micro-rheological Measurements of Associating Complex Fluids will be offered in Pittsburgh, October 11-12, 2003. The instructors are Professors Robert Prud'homme and William Russel of Princeton University and Professor James Harden of Johns Hopkins University. Registration forms and complete registration information may be found at the Society of Rheology website at <http://www.rheology.org/sor>.

CHANGE OF ADDRESS

If you are moving, please inform Janis Bennett by phone at (516) 576-2403 or by fax at (516) 576-2223. You may also write to her at:

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Melville, NY 11747

TA Instruments Finalizes Purchase of the Rheology Division of Rheometric Scientific

TA Instruments, Inc. of New Castle, DE has completed its purchase of the assets of the Rheology Division of Rheometric Scientific, Inc. of Piscataway, NJ. The sales, service, and support operations of both companies are currently being consolidated into a single worldwide organization. The Piscataway facility will ultimately close with all engineering and manufacturing staff relocating to New Castle, DE. The name of the combined company will remain TA Instruments.

To the Membership:

The tables below summarize the financial standing of the Journal of Rheology and the Society of Rheology for year-end, 2002. The proposed budget for 2004 will be presented to the membership at the Annual Meeting in October for approval. As always, I will be pleased to describe in detail the origin of any numbers included in the tables below.

The financial highlights for 2002 include a surprisingly good year for the *Journal of Rheology*, although much of this is attributable to the proceeds from two legal settlements with consolidators. For 2003, the *Journal* has been put on notice concerning possible losses of revenue because of the failure of a large consolidator "RoweCom." Thus we probably not meet our budget this year.

The last table is the balance sheet as of December 31, 2002. The important item in this table is the Unrestricted Net Assets, which represents the unencumbered financial position of The Society. This represents what the Society can safely commit for new projects.

Respectfully submitted,
Montgomery T. Shaw, Treasurer

Journal of Rheology

(All amounts: USD)	2004 Trial Budget	2003 Budget	2002 Actual	2001 Actual	2000 Actual
RECEIPTS					
Subscriptions	206,250	209,000	215,712	211,351	194,536
Reprint Sales	5,500	6,500	5,467	6,514	6,709
Ad Sales	32,000	35,000	33,615	32,537	28,135
CD sales (net)	0	0	0	0	2,534
JORO revenue	13,000	4,300	11,869	2,922	141
Miscellaneous	1,000	1,500	1,622	5,249	288
TOTAL RECEIPTS	257,750	256,300	268,284	258,572	232,343
DISBURSEMENTS					
Ads	9,000	9,000	9,755	8,459	12,146
Reprints, Single Copy	5,400	6,532	6,010	6,656	11,596
Paper, Printing	38,000	39,484	36,147	37,288	31,659
SOR Editorial	48,000	47,000	46,116	49,395	38,297
Production	78,400	78,400	72,863	74,088	73,251
Fulfillment	7,000	8,300	6,922	7,507	7,673
Distribution	23,500	21,031	18,397	19,759	14,847
Electronic publishing	42,500	44,000	41,115	40,943	47,615
Miscellaneous	5,600	6,100	7,511	9,089	0
TOTAL DISBURSEMENTS	257,400	259,847	244,834	253,184	237,084
Net	350	-3,547	23,450	5,389	-4,741

The Society of Rheology
Receipts and Disbursements

All numbers, USD	Budget 2004	Budget 2003	Actual 2002	Budget 2002	Actual 2001
RECEIPTS					
Dues	55,000	60,000	55,963	68,000	58,163
Interest	11,000	14,000	14,062	32,000	34,438
Journal of Rheology	257,750	256,300	268,284	233,050	270,072
Mailing List Sales	1,000	500	1,135	500	1,101
Donations	0	0	0	0	0
Bulletin Advertising	2,000	2,000	2,023	2,500	2,448
Annual Meeting (net)	0	0	4,752	0	460
Short Course (net)	0	0	1,298	0	-900
TOTAL RECEIPTS	326,750	332,800	347,516	336,050	365,782
DISBURSEMENTS					
AIP Dues Bill & Collect.	7,000	6,000	10,362	8,500	5,660
AIP Adm. Services	9,500	9,500	9,500	9,500	9,144
AIP Mem. Soc. Dues	7,600	7,500	7,528	7,500	7,431
Contributions and Prizes	3,000	3,000	2,011		
Journal of Rheology	257,400	259,847	244,834	256,500	256,386
Bulletins and Abstracts	4,000	7,000	3,640	7,000	18,880
Bingham Award	7,500	7,500	5,000	5,500	2,540
Executive Cmt. Meetings	7,000	7,500	5,996	7,500	2,979
Pres. Discretionary Fund	1,500	1,500	0	1,500	0
Treas. Discr. Fund	1,500	1,500	0	1,500	176
Progr. Chm. Discr. Fund	2,000	2,000	708	2,000	1,000
Office Expenses	6,000	2,000	5,948		560
Banking Services	100	100	88	200	88
Liability Insurance	6,000	4,000	4,133	3,500	3,656
Membership Directory	0	0	0	0	
Membership Broch. & Appl.	200	200	0	200	0
Accountant	2,200	2,200	1,900	1,900	1,900
Student member travel	600	5,000	3,366	4,000	8,404
Annual meetings, future	3,000	3,000	0	3,000	2,665
Website	1,000	1,000	832		126
Miscellaneous	1,500	1,500	0	1,500	700
TOTAL DISBURSEMENTS	328,600	331,847	305,847	330,000	325,307
Net	-1,850	953	41,669	6,050	40,474

The Society of Rheology, Inc.

Balance Sheet

(all amounts, USD)

	<u>2002</u>	<u>2001</u>	<u>2000</u>	<u>1999</u>
Assets				
Cash in checking account	466	9,374	9,400	10,735
CD's	0	0	15,000	0
Balance in AIP account	915,334	843,151	827,040	766,911
Total Assets	915,800	852,525	851,440	777,646
Liabilities and Net Assets				
Liabilities				
Deferred subscription revenue	162,363	96,465	138,500	141,827
Deferred member dues	0	41,003	43,300	41,376
Total Liabilities	162,363	137,468	181,800	183,203
Net Assets				
Publication reserve	450,000	450,000	450,000	450,000
Student travel grant reserve	10,000	10,000	10,000	10,000
Annual Meeting reserve	70,000	70,000	35,000	35,000
Operating reserve	70,000	70,000	70,000	70,000
Unrestricted	153,437	115,057	104,640	29,443
Total Net Assets	753,437	715,057	669,640	594,443
Total liabilities and net assets	915,800	852,525	851,440	777,646