

Physics is Fun October 21, 2000



AIAA Pre-College Outreach Chair Joy Conrad illustrates the outer space environment with a balloon and vacuum pump

NASA Mandi Baldwin has a race of moments of inertia on an inclined plane



AIAA Houston Section ◆ ONLINE ◆ www.jsc.nasa.gov/aiaa

[News](#) [Membership](#) [Upcoming Events](#) [Committees](#) [Leadership](#) [Horizons](#)

Becoming an AIAA member

Are you interested in becoming a member of the AIAA or renewing your membership? You can fill out a membership application online by going to the AIAA membership website at www.aiaa.org/information.

March 15 Input Deadline for the Next Edition of Horizons

Contributions can be submitted by email to John Keener at john.keener@lmco.com.

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Chairman's Corner

By Dr. Garland Bauch, Chairman

Greetings to the Houston Section membership!! There are many exciting activities happening in the Section. At the last AIAA Houston Section Executive Council (EC) meeting, the Executive Tours (ETs) and Congressional Visits Day were discussed at length.

An Executive Tours meeting with the United Space Alliance (USA) occurred in January. A Section group including Russ Filler, David Lechner, Pete Scobby, and myself met with Mr. Russ Turner, Chief Executive Officer of USA, Mr. Michael McCulley, Chief Operating Officer of USA, and Mr. Loren Shriver. This meeting revealed how the Section can work with the local companies. For example, we should review stakeholder business objectives and determine which Section programs/ activities support stakeholder objectives, Section membership professional development, and promote NASA Space Programs. I feel that the success of the Executive Tours in establishing effective long-term relationships with local stakeholders is crucial to the success and relevancy of future Houston Section programs. This success is partly based on obtaining greater stakeholder financial support to conduct Section programs/activities. To date, three (3) of the 3 executives with whom we have met agreed to provide an Executive for the AIAA Houston Section Executive Advisory Board (EAB). This Board will advise the Section Council on programs/activities relevant to Section members and companies that employ them. A visit with Mr. Jay Honeycutt of Lockheed Martin is scheduled in March. About 8 other company executives will be visited before May of this year.

Congressional Visits Day will occur on March 21-22 in Washington, D.C. Concern was expressed at the EC meeting that there was not adequate corporate support for section officers to attend CVD. The EC decided to use section and national funds to provide travel assistance to CVD.

Several other activities have been the Services' Vehicle Conference (SVC) call for papers, Spirit of Apollo Scholarship call for applications, and discussions with World Space Congress officials. Please encourage anyone you know interested

in giving a paper to SVC to provide an abstract. Information on supplying an abstract is available at <http://www.jsc.nasa.gov/aiaa/svc2001> or by calling SVC Chair/Carlos Blanco at 281-244-4580. Upcoming Section activities are shown in the Calendar of Events later in this newsletter. Specially, note the February 27th Dinner program with Mr. Phil Mongan on Spacehab in the Gilruth Ballroom. Other future near-term events are the Houston Science and Engineering Fair, and First Robotics Competition. The Section will be sending volunteers to all these events.

Please contact me at garland.t.bauch1@jsc.nasa.gov or 281-483-1309 if you have any suggestions for future Section membership and outreach programs.

Editor Needed

By John Keener, Publications Chair

Our last editor has left the work force to raise her child (at least for the near future). As such we are in need of an editor for the Horizons. If anyone would like to volunteer for this position call me at (281)333-7086 or send me an email at john.keener@lmco.com.



AIAA Engineers Week Banner

The AIAA announces the 1st AIAA Evolution of Flight Campaign Art Contest

To find more information on the contest and rules, please visit
http://www.flight100.org/activities/activities_artcontest.html

WHO: Students from all over the world, ages 5-13.

WHAT: The 1st AIAA Evolution of Flight Campaign Art Contest. Entries must be on an 8-1/2" x 11" sheet of white paper (no computer generated or three-dimensional art is eligible). Artwork should be based on the theme "The Future of Flight" and should depict your vision of what air or space travel will look like in the next 100 years. The winning artwork will be featured on the AIAA Evolution of Flight web site and may be included in other promotional materials, including a traveling display. Prizes will be awarded.

WHEN: Entries must be postmarked by 16 March 2001. Entries postmarked after 16 March 2001 will not be considered in the contest.

HOW: Complete your artwork and write your name and age on the front of your entry in the bottom right corner in black marker ink. Have your parent or guardian fill out and sign the AIAA Entry/Parental Contest form and mail the entire package to:

Evolution of Flight Campaign Art Contest
Attn: Kimberly Grant
1801 Alexander Bell Drive, Suite 500
Reston, VA 20191-4344

WHY: AIAA wants to excite and engage children of all ages in the upcoming centennial of the first successful, manned, controlled, heavier-than-air, powered flight by Orville and Wilbur Wright on December 17, 2003.

Congressional Visits Day Approaches Again

By John Bendle, Public Policy Chair

Spring is a significant time of year for AIAA when it comes to public policy because this is when our nation's legislators open their doors for face to face dialogues with AIAA members. Congressional Visits Day, a traditionally grass roots effort, is organized and run by AIAA National and plays host to AIAA members from across the country every year. Day one of the two-day event consists of public policy briefings, a guest speaker from a relevant government agency and then breakout groups in preparation for the next day. Day two is when AIAA members, in groups of three or four, have short meetings with members of Congress to deliver the AIAA message and have an open dialogue about the current state of the industry. All attempts are made to have the groups meet with their local representatives so they can speak as constituents and discuss how the AIAA message directly relates to their particular district.

The Houston Section has had a strong presence in the past and will continue that tradition in 2001 with five section members confirmed attending and more in the works. We are currently refining our Section message based on current AIAA National priorities, past messages and current issues that directly affect our local members. If you have questions about Congressional Visits Day or any other Public Policy issues, contact your Public Policy chair at John.Bendle@SW.Boeing.com

Call for Lawrence Sperry Award Nominees

By Nicole Mullins, College and Co-op Chair

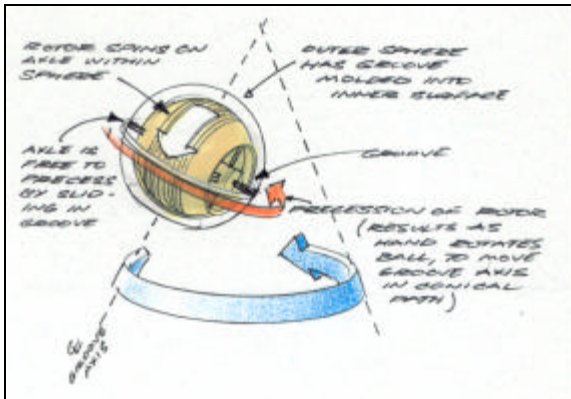
The Lawrence Sperry Award honors Lawrence B. Sperry, pioneer aviator and inventor, who died in 1923 in a forced landing while attempting a flight across the English Channel. This award is presented for a notable contribution made by a young professional to the advancement of aeronautics or astronautics. The nominee must be under 35 years of age on December 31 of the year preceding the nomination. The award is generally presented at the AIAA Aerospace Sciences Meeting and Exhibit. Nominations are due July 1, 2001. For more information or to submit a nomination, please contact Nicole Smith Mullins at (281) 244-7145, or Nicole.Mullins1@jsc.nasa.gov.

Space Vehicle Gyroscopes and the DynaBee Gyro Exerciser

By Douglas Yazell, Guidance, Navigation, and Control Technical Committee Chair

Gyroscopes are well known to students of vehicle navigation and control, and many excellent educational films have made most people familiar with precessing bicycle wheels, etc. Recent advances in composite materials have apparently enabled some resourceful inventor or inventors to create the DynaBee Gyro Exerciser and similar devices carrying other brand names, allowing us to feel the torques that result from a rotor spinning at about 8,000 revolutions per minute (RPM), according to the claim on the packaging. A friend of mine named Michael told me about this in a letter in 1993, and I quickly bought one for about \$40 at a store.

To picture this device, imagine a hard, spherical, translucent shell the size and shape of a baseball. The spinning wheel (rotor) inside this shell is wide, like a wide tire whose surface is curved to fit in this sphere. The wheel is also made of hard material. The wheel's axle is a slender metal rod whose ends fit into a groove carved into the interior of the sphere. A section of the sphere is cut out to allow someone to use a thumb to start the wheel spinning. If the sphere were a globe, the cutout line would be about 60 degrees northern or southern latitude, and the inner groove for the wheel's axle would be the equator.



Michael's drawing of the DynaBee Gyro Exerciser from his 1993 letter

The mathematics required to describe such rotational devices are useful in many other areas of our aerospace community. Working with orbits requires calculations with spherical quantities, and if the subject is approached as spherical trigonometry, there are very few references to be found. Keeping track of the attitude of aircraft and spacecraft requires rotational mathematics, and related equations often lead to the use of quaternions to avoid the singularities encountered in the matrix form of those equations.

The best guide I have found to writing equations of motion for such a device is a short NASA EG2 memo (EG2-92-16) dated March 12, 1992, "Angular Momentum Principle and CMG Torque", by Carlos Roithmayr. It derives equations for the CMG torques acting on ISS. A little bit of additional work on the part of the reader reveals the "spin into in equals out" principle. The text referenced in the memo is by Kane and Levinson, Dynamics: Theory and Application, 1985. Using notation similar to Roithmayr's, I believe an accurate equation of motion for the DynaBee Gyro Exerciser is

$$M = {}_N W_G \times I \bullet_N W_W + \overset{\circ}{I} \bullet_N W_W + I \bullet_N \overset{\circ}{W} W$$

where

$${}_N W_W = {}_N W_G + W_{\text{wheel about its spin axis}} + W_{\text{wheel about groove axis}}$$

In the above equations, M is the torque on the wheel, angular velocities are, "omega of G in N", etc., and the overcircle represents the time derivative as seen by an observer in the G reference frame. The W represents the wheel's reference frame, G represents the reference frame of the outer sphere of the device, and N represents the Newtonian reference frame. The dot product indicates the use of basis-independent notation, which means the symbol I represents the basis-independent inertia dyadic, not the basis-dependent inertia matrix. Note that the wheel's spin axis remains perpendicular to the groove axis.

The Houston AIAA GN&C Technical Committee continues to recruit qualified engineers of any age to help with our work. A first draft of our goals, etc., can be viewed by following the link called Section Links (Houston Technical Committees) at <http://www.jsc.nasa.gov/aiaa>. We would like to recruit at least one member from each "GN&C" company in the Clear Lake area. Our three current members work for Honeywell, Lockheed Martin, and Hernandez Engineering. Current plans include a lunch-and-learn in March 2001 with Dr. John Junkins from Texas A&M University.

Membership Dues to Increase

By Sophia Bright, Membership Chair

It was recently announced that the AIAA dues will increase on April 1, 2001. Table 1 shows the breakdown of the various membership options and the fees associated with each one. Additional details are on the AIAA web site at <http://www.aiaa.org/> by selecting the purchase/renew membership option.

It should be noted that there are significant changes to the way the fees are applied to those in the Associate and Professional membership categories. There is no longer a distinction for the age of the member in determining the fee paid by that member (except for the Young Professional membership). Additionally, the fees associated with being a Fellow has been differentiated from the Professional membership.

If any of you need to renew your membership or know someone who is interested in joining but has not at this point, please take advantage of the current membership fees.

If you have any questions or comments regarding the changes being made to the fees please feel free to call me at 281-244-4735 or contact the AIAA Customer Service number at 1-800-682-2422 (or e-mail them at custserv@aiaa.org).

Table 1: AIAA Membership Description and Fee Changes

| Membership Type | Annual Fee | Fees as of April 1, 2001 |
|--|---|---|
| Associate | \$70 if 30 yrs old or younger \$75 if 31 yrs old or older | \$85 |
| Professional | \$70 if 30 yrs old or younger \$75 if 31 yrs old or older | \$85 |
| Fellows | \$75 | \$100 |
| Student to Professional Membership Transition | Free | Free |
| Young Professional | \$37.50 | \$42.50 |
| Spouse | \$37.50 | \$42.50 |
| Student | \$15 for new membership or renewing between 31 July and 31 January \$7.50 if renewing between 1 February and 30 June | \$20 for new membership or renewing between 31 July and 31 January \$10 if renewing between 1 February and 30 June |
| Return to Full-Time Study | \$30 | \$42.50 |
| Retired | \$30 | \$42.50 |
| Lifetime | \$1125 | \$1275 |
| Unemployed | \$25 | \$42.50 |

Oklahoma University Students Visit JSC

By Nicole Mullins, College and Co-op Chair

Students from the OU AIAA branch visited NASA JSC on January 11-12, 2001. They toured various facilities such as X-38, Ellington Field, NBL, Mission Control, and the Shuttle and Station Simulators in buildings 5 and 9. The students also were given presentations by The Boeing Company about the International Space Station and what it is like to work in the JSC community.



Career Planning and Development Workshop

By Nicole Mullins, College and Co-op Chair

The Houston AIAA Young Professionals are planning a Career Planning and Development Workshop for young professionals and university students in the NASA JSC community.

The workshop will offer two parallel sessions containing courses in financial planning, presentation skills, professional engineering certification process, and conflict management, among others. Professional organizations are also being invited to attend to set up an open forum where young professionals can talk with them about what their organizations can offer.

The workshop will be held on March 31, 2001 at the USA Training Academy building, 1045 Gemini, Houston TX 77058. Registration will be that morning from 8:00-8:30, and sessions will be held from 8:30-12:30. Lunch will be provided immediately following, as well as a motivational guest speaker. The cost is \$20 for AIAA and non-AIAA members. For registration forms or more information, please contact Nicole Smith Mullins at (281) 244-7145 or Sophia Bright at (281) 244-4735.



AIAA Member Nicole Smith Mullins (left) consults one of the Human Factors design students.



Dr. Merri Sanchez, right, oversees the students activities with Dr. Bonnie Dunbar.

Mars Settlement Design Competition

By Nicole Mullins, College and Co-op Chair

The Mars Settlement Design Competition was held February 2-4, 2001. 122 High school students from as far away as Iowa came to team up and design a Mars Settlement. AIAA members Garland Bauch, Merri Sanchez, Jorge Molia Acosta, Nicole Smith Mullins, Joy Conrad, and Deon Brown all participated as judges, CEOs, librarians, and technical presenters. The Grumbo Aerospace team won the design competition, although the results were close!

Associate Fellow

By Merri Sanchez, Past-Chair

The 2001 Associate Fellow Grade Committee met in August 2000 and selected 128 members for upgrade to Associate Fellow. All selectees were approved by the National Membership Committee. The Associate Fellows were recognized at the 38th Aerospace Sciences Conference in Reno, NV this past January. We congratulate the following Houston Section members who were selected as 2001 Associate Fellows.

Rakesh K. Bhargava - Houston
Eileen M. Collins - Houston
Sally P. Davis - Houston
William S. McArthur - Houston
Clarence T. Modlin Jr - Houston
Lisa M. Nowak - Houston
Howard A. Wagner - Houston
John D. Whitcomb - Houston

AIAA 2001 Fellow Selection

By Merri Sanchez, Past-Chair

Historically, Fellow selection is limited to candidates demonstrating strong potential for leadership and distinguishing themselves in the field of aerospace. For every 1000 voting members of the Institute, one Fellow is selected. Thirty Fellows were selected for 2001.

We congratulate Houston Section members Fazle Hussain of the University of Houston, and Donald T. Ward formerly of Texas A & M in being selected as 2001 Fellows.

National Engineering Week Future City Competition FC2001

By Zafar Taqvi, Automation & Robotics Chair

AIAA Houston Section sponsored the Best Space-Based Design special award at the Texas-Houston Regional of the Future City Competition held last-month. Dr. Rakesh Bhargava, AIAA Houston Section Awards Chairman, judged all the entries and awarded the city of 'Paradise 6', an entry from St. Paul's School in Covington, Louisiana. John Keener, AIAA Houston Section, was mentor/engineer for Seabrooke Intermediate School future city 'Titusville'. Dr. Zafar Taqvi, AIAA Houston Section, was the Regional Coordinator of the event.



Dr. Zafar Taqvi making the award announcements.



Dr. Rakesh Bhargava with the AIAA Award Winning Team

The Automation and Robotics Technical Committee of the
American Institute of Aeronautics and Astronautics (AIAA) Houston Section

Presents WAR 2001

Workshop on Automation and Robotics

Friday, April 27th, 2001

Gilruth Recreation Center, NASA/JSC

"A State-of-the-Art Robotics Tutorial"

8:00 AM **Registration begins**

8:30 AM Tutorial

11:30AM-1:00PM **Luncheon**

(A Combined luncheon for the attendees of **INNOVATIONS 2001** and the **WAR 2001**)

General Chairman: Dr. Gary Funk, Foxboro

Workshop Cost : FREE (but Registration is Required)

Deadline for registration: April 14th, 2001 Cost for luncheon: \$7.50

Contact Sheryl Critelli (281-483-8243) for both symposia and for luncheon reservations

Co-sponsored by the Instrument Society of America, Robotics and Expert Systems Division

INNOVATIONS 2001

Theme: INNOVATIVE SCIENCE AND TECHNOLOGY FOR THE NEXT CENTURY

Organized by

The Clear Lake Council Of Technical Societies

in cooperation with, and co-sponsored by, the CLCTS member organizations

AIAA, IEEE, ISA, ISSA, and INCOSE

FRIDAY, APRIL 27th, 2001

Gilruth Center, NASA Johnson Space Center

Registration starts at 11:30 am

NOON LUNCHEON (Details will be announced soon)

PROGRAM

1:15-2:15 PM

Technical Sessions (A)

Parallel sessions organized by the member

2:15-3:15 PM

Technical Sessions (B)

Parallel sessions organized by the member

3:15-4:15 PM

Technical Sessions (C)

Parallel sessions organized by the member

4:15-5:00 PM RECEPTION

Hosted by local Aerospace Companies

For additional information on the conference, please contact:

Edward Jablonski/Dynacs, General Chairman, edward.j.jablonski@boeing.com

Session Chairs: Dr. Ajit Kwatra/Dynacs/AIAA ajit.kwatra@sw.boeing.com

Jeff Booher/Boeing/AIAA jeffrey.d.booher@boeing.com

Bill Haskins/Boeing/INCOSE william.r.haskins@boeing.com

FOR REGISTRATION Contact Sheryl Critelli at 281-483-8243

INNOVATIONS: \$5.00; Luncheon Only: \$7, Full Day Program: \$12.00

REGISTRATION DEADLINE- April 14th, 2001

INNOVATIONS 2001 IS SPONSORED BY THE JAIPCC EXECUTIVE BOARD

More info available (AIAA Houston Website) at: <http://www.jsc.nasa.gov/aiaa/>

Calendar of Events

March 2001

3/01 2000-2001 Officer Nominating Committee named
3/05 Executive Council Meeting (*before the dinner meeting*)
3/05 Dinner Program with Phil Mongan – Spacehab in Gilruth Ballroom
3/15 Identify Fellow Nominations
3/15-17 First Robotics Competition at Astroarena (Lone Star Regionals) Ends
3/16 Newsletter inputs due
3/21-22 Congressional Visits Day
3/22-24 Houston Science and Engineering Fair
3/28 *AIAA Natl Bd of Dir. Ballots due at HQ*
3/31 *Young Professional Career Development Planning Workshop*

April 2001

4/01 *Evolution of Flight Funding Requests due to HQ*
4/02 Executive Council Meeting
4/04 *Dinner program with Walt Gillette, "747X Program" (tentative)*
4/06-07 Region IV SPC at The University of Texas, Arlington, Contact: Ed Eaton Tel. 505-830-1432, mail:

Edwin.A.Eaton@Imco.com

4/08 Region IV RAC at Dallas
4/13 *STS-1 20th Anniversary event being planned by NASA Alumni League*
4/14 2000-2001 Officer Election ballots mailed
4/15 Associate Fellow upgrade nominations due to National
4/16 Newsletter inputs due
4/26 *Dinner program with Randy Brinkley*
4/27 morning: Workshop on Automation and Robotics (WAR) 2001 at Gilruth Center
4/27 afternoon: INNOVATIONS 2001 Conference at Gilruth Center

May 2001

5/01 Houston Section Spirit of Apollo scholarships applications due
5/07 Executive Council Meeting
5/7-9 Global Air and Space 2000 International Business Forum and Exhibits in Washington, DC
5/09 2001 AIAA Honors Night Banquet
5/15 2000-2001 Officers announced
5/15 Spirit of Apollo Scholarship winner announced
5/15 Associate Fellow references due to National
5/18 Newsletter inputs due
TBD Clear Lake City Technical Societies Annual Awards Banquet

TBD Space Day 2001

June 2001

6/04 Executive Council Meeting
6/07 Newsletter inputs due
6/15 Fellow and Honorary Fellow nominations due to National
6/20 Honors and Awards Banquet
6/30 Annual Report due to Regional and National
6/30 Award Forms due to Regional and National for Membership, Public Policy, Communication, Young Professionals, Career Enhancement, Newsletter
6/30 Budget and Audit Report due to Regional and National
6/30 2001-2002 Section Officer Roster due to Regional and National
6/30 Mailing Label Request Form due to Regional and National
6/30 Lawrence Sperry Award forms due
TBD Transition Meeting for Officers

July 2001 (new council)

7/13-14 Regional Leadership Conference

October 2001

- Service Vehicles' Conference 10/14-17



Houston Section

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February 2001
