Technical Soaring



The Scientific, Technical and Operational Journal of the Organisation Scientifique et Technique Internationale du Vol à Voile (International Scientific and Technical Organization for Gliding)

	Volume 36, Number 4
EDITOR Dr. Judah Milgram JOURNAL MANAGER	From the Editor
Prof. Emeritus Dr. Edward (Ward) Hindman	
OSTIV PRESIDENT Prof. Emeritus Ir. Loek M. M. Boermans The Netherlands	Know the Sky: A History of Interaction between Meteo- rology and Soaring Russell E. Lee
OSTIV VICE PRESIDENT Dipl. Ing. Christoph Kensche Germany	A Note on Glider Electric Propulsion Francisco Leme Galvão
MEMBERS OF THE OSTIV BOARDDipl. Ing. John Ashford— AustraliaDipl. Ing. Helmut Fendt— GermanyProf. Dr. Edward Hindman— USAProf. Dr. Mark Maughmer— USADipl. Ing. Ian Oldaker— CanadaDr. Ing. Lukáš Popelka— Czech RepublicDr. Hermann Trimmel— Austria	Swarm Data Mining for the Fine Structure of Thermals Alfred Ultsch102
ASSOCIATE EDITORS Prof. Dr. Zafer Aslan — <i>Turkey</i> Chair, Scientific Section and Chair, Meteorological Panel Prof. Dr. Mark Maughmer — <i>USA</i> Chair, Technical Section	
 Dipl. Ing. Helmut Fendt — Germany Chair, Sailplane Development Panel Dipl. Ing. Ian Oldaker — Canada Chair, Training and Safety Panel Prof. Goetz Bramesfeld — USA 	The objective of <i>Technical Soaring (TS)</i> is to document recent advances in the science, technology and operations of motorless aviation. <i>TS</i> is published quarterly by the Organisation Scientifique et Technique Internationale du Vol à Voile (International Scientific and Technical Organization for Gliding, OSTIV); Kluyverweg 1, NL-2629 HS Delft, The Netherlands, Tel: +31 15 278 6387, fax: +31 15 278 3533, email: 1. m.m.boermans@tudelft.nl, URL: www.ostiv.org. Subscription is restricted to OSTIV members but material can be submitted by anyone. Rates per calendar year are $\in 25$ for students under 25 years of age, $\in 45$ for Individual/Local Club Membership; $\in 80$ for Scientific/Technical Organization/Library Membership and $\notin 250$ for Active Members (National Aero Club Members of FAI). Issues are sent by air overseas then surface bulk delivery.
Copy editing/Layout — Judah Milgram Washington, DC USA Printing — The Hub Print and Copy Center Ft. Lee NJ USA Distribution — Pitney Bowes Itasca IL USA © 2012 Organisation Scientifique et Technique Internationale du Vol à Voile All rights reserved ISSN#0744-8996	Submitted research papers will be peer-reviewed. Guidelines for preparation and sub- mission of manuscripts can be found on the OSTIV website in the 'editor' section. <i>TS</i> is in print (grey-shade) and online (full-color) at journals.sfu.ca/ts/. The print copy will continue indefinitely. Back issues, from Vol. 24, No. 4 (2000) to the cur- rent issue, are online; earlier issues will be put online as possible. OSTIV members have complete access to <i>TS</i> online; non-members access titles and abstracts. Members should contact the webmaster, Jannes.Neumann@t-online.de, for access. Back is- sues can be purchased from either the OSTIV Secretariat or, in the USA, by email from bernald@juggernaut.com. A quick-start guide to access <i>TS</i> online is on the OSTIV website. An index of <i>Technical Soaring</i> (Vol. 1 (1971) through Vol. 34 (2010)) is at soaringweb.org/Soaring_Index/Technical_Soaring. Issues are indexed by au- thor, subject and issue. Additional information on <i>TS</i> and information on OSTIV Pub- lications can be found on the OSTIV website in the OSTIV Index. The Index can be searched by right-clicking on the first page, clicking on 'Search', typing in the keyword and clicking on the 'Search' button. The name Technical Soaring and its cover layout are fully rights-protected and belong to the Soaring Society of America; they are used by permission.