# 高分子科学系列讲座

## 高分子物理与化学国家重点实验室 中国科学院长春应用化学研究所

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| **序　　号** | PS2012-05 | **总 序 号** | PSLAB127-PS2012-05 |
| **报 告 人** | Victor Steinberg | **职　　称** | 教授 |
| **从事专业** | 软物质物理、流体力学 | | |
| **建 议 人** | 刘勇刚、姬相玲 | **主 持 人** | 韩艳春 |
| **报告时间** | 2012.4.20(周五)上午9:30 | **报告地点** | 主楼四楼学术厅（410 房间) |
| **单　　位** | Weizmann Institute of Science, Israel | | |
| **通讯地址/邮编** | Department of Physics of Complex Systems, Weizmann Institute of Science, Rehovot 76100, Israel | | |
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| **出生年月** | 1940.7 | | |

**报告人背景**

**1962** M.A. Mechanical Engineering, Kharkov Polytechnical Institute, USSR

**1966** M.A. Physics, Kharkov State University, USSR

**1971** Ph.D. Physics, Scientific Research Institute of Physico-Technical Measurements, Moscow, USSR

**1964-1968** Research Fellow Scientific Research Inst. of Iron and Steel Metallurgy, Kharkov, USSR

**1968-1971** Research Fellow, Scientific Research Inst. of Physico-Technical Measurements, Moscow, USSR

**1971-1974** Sr. Res. Fellow, Scientific Research Inst. of Iron and Steel Metallurgy, Kharkov, USSR

**1975-1980** Sr. Lecturer and Sr. Res. Fellow, Tel-Aviv University, Israel

**1980-1983** Res. Assoc., Univ. of California, Santa Barbara, U.S.A.

**1983-1989** Assoc. Professor, Weizmann Institute of Science, Israel

**1987-1988** Ulam Distinguished Visiting Scholar, Los Alamos Nat. Lab., Univ. of California, NM, U.S.A.

**1989-present** Professor, Weizmann Institute of Science, Israel

**1992-present** **The Harry De Jur Professorial Chair in Applied Physics**, Weizmann Institute of Science, Israel

**1993-1994** Visiting Professor, Ecole Normale Superieure, Labor.de Physique, Lyon, France

**1994 (Summer)** Humboldt Professor, University of Bayreuth, Germany

**1998-1999** Humboldt Professor, Max Planck Institute for Extraterrestrial Physics, Garching, Germany

**2000-2002** (February-March) Visiting Distinguished Professor, University Joseph Fourier, Grenoble, France

**2004** (June-August), Visiting Professor, ICTP, Trieste, Italy

**2006** (February-April) Humboldt Professor, Max Planck Institute for Extraterrestrial Physics, Garching, Germany

**2009** (October-November) JSPS Visiting Professor, University of Tokyo and Kyoto, Japan

**Awards**:

**1987** Ulam Distinguished Scholar LANL, USA

**1993** Lise Meitner-Alexander von Humboldt Research Award for the Scientific Cooperation between Israel and Germany

**2000-2003** Municipal Professorial Chair of the University of Joseph Fourier supported by the town Grenoble, University of Joseph Fourier, Grenoble, France

**2009** October-November JSPS Fellow, Universities of Tokyo and Kyoto, Japan

**2009-2010** C.N. Yang Visiting Professorship, The Chinese University of Hong Kong

**Area of Interest:**

- Soft Matter Hydrodynamics: polymer solutions, suspension of vesicles, capsules, red blood cells, etc.
- Dynamics of soft micro-objects in various flows
- Convective and hydrodynamic turbulence
- Hydrodynamic instabilities, pattern formation and dynamics in nonequilibrium systems, defect dynamics
- Hydrodynamics of fluid near the gas-liquid critical point
- Superfluidity and superfluid hydrodynamics
- Dynamics and hydrodynamics of complex plasma

**Publications**:

over 170 publications in the leading international journals and 5 patents

| 报告题目 | **Elastically-driven turbulent flow and polymer stretching** |
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**内容摘要**

Flow of a visco-elastic polymer solution can become quite irregular even at low velocity, high viscosity, and in a small vessel. The flow resistance increases by a factor of about twenty and can be compared to turbulent flow in a pipe at high Reynolds numbers, the velocity power spectra show algebraic decay, and mixing is enhanced many orders of magnitude. While the Reynolds number may be arbitrary low, the observed flow shows main features of developed turbulence. This ***elastic turbulence*** is accompanied by significant stretching of the polymer molecules. By studying dynamics and statistics of stretching of DNA molecules with known elastic properties in elastic turbulence created by the unlabeled molecules we for the first time are able to quantitatively estimate elastic stresses. This information is used to disprove theory of elastic turbulence based on a model of polymers with linear elasticity.