

**Proceedings of  
International Conference on  
Mechanical Transmissions and Mechanisms  
(MTM'97)**

**July 1st-4th, 1997**

**Tianjin, China**



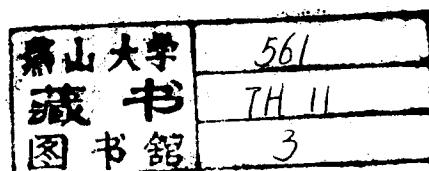
**China Machine Press  
Beijing China**

9004829

Proceedings of  
International Conference on  
**Mechanical Transmissions and Mechanisms**  
(MTM'97)

July 1st—4th, 1997  
Tianjin, China

TH II / 18



China Machine Press  
Beijing, China



0167998

ISBN 7-111-05773-2

9 787111 057734 >

图书在版编目(CIP)数据

机械传动与机构学论文集·英文/天津大学机械系编著·  
北京:机械工业出版社,1997.6

ISBN 7-111-05773-2

I. 机… II. 天… III. ①机械传动-文集-英文 ②机构学  
-文集-英文 IV. TH11-53

中国版本图书馆 CIP 数据核字(97)第 12986 号



DEDICATED TO HEINRICH HERTZ ON THE CENTENARY OF THE PUBLICATION  
OF HIS 1882 PAPERS ON CONTACT PROBLEMS.

# Conference Organization

## Sponsored by :

Mechanical Transmission Institution, Chinese Mechanical Engineering Society (CMES)  
IFToMM Member Committee of China  
Tianjin University

## Cosponsored by :

Chinese Mechanical Engineering Society  
International Federation for the Theory of Machines and Mechanisms (IFToMM)  
National Natural Science Foundation of China  
IFToMM Commission of Conferences  
Technical Committee of Gearing and Transmissions, IFToMM

## Conference Chairman :

Zhang Qixian: Fellow of Chinese Academy of Engineering

## Scientific Committee :

Chairman: Li Huamin

Co-Chairman: Chen Yong Meng Huirong Wen Bangchun

Members:

Gan Dongying	Gong Hansheng	Liang Chonggao	Liang Tianpei	Peng Wensheng
Su Daizhong	Tao Yanguang	Wang Yixing	Wu Xiaoling	Xu Hongji
Xu Puzi	Yan Hongsen	Zhang Guanghui	Zhang Qixian	Zhang Wenjun
Zhou Youqiang	Zou Huijun			

## International Honorary Committee :

E. L. Airapetov (Russia)	J. Angeles (Canada)	G. Bianchi (Italy)
W. Bredley (USA)	A. G. Erdman (USA)	E. Filemon (Hungary)
F. Freudenstein (USA)	V. I. Goldfarb (Russia)	M. Kato (Japan)
T. Koetsier (Netherlands)	A. Kubo (Japan)	K. Luck (Germany)
H. Makino (Japan)	A. Morecki (Poland)	L. Pust (Czech)
J. S. Rao (India)	B. Ravani (USA)	B. Roth (USA)
M. Vukobratovic (Yugoslavia)		

## Organizing Committee :

Chairman: Zhang Ce

Co-Chairmen: Huang Zhen Huang Tian

Secretary General: Huang Tian

## Local Organizing Committee :

Xu Yuhuan Bu Yan Lu Xinian Yang Yuhu Dong Gang Zhou Lihua Qin Hongshan  
Zhang Xiangyang Lu Hechuan Zhu Jiafu

## Zhang Qixian

Conference Chairman

Fellow of Chinese Academy of Engineering

## Li Huamin

Chairman of Scientific Committee

Honorary Chairman of Mechanical Transmission Institution, CMES

## Zhang Ce

Chairman of Organizing Committee

Chairman of IFToMM Member Committee of China

## PREFACE

As it is witnessed by the whole world that China has brought herself into a new historical period since the late of 1970s, great progress has been made in the field of mechanical transmissions and mechanisms in China, attributed to the continuous support from National Natural Science Foundation of China, local governments and enterprises. The fruitful achievements acquired during the last two decades can be demonstrated by the ever increasing tendency towards the close collaboration among universities, institutes and industries, hundreds of technical papers published on the journals and proceedings, and even more than these the successful implementation of theoretical outcomes to practical application. Just as China in the reform needs to open herself to the outside world, Chinese scholars are eagerly expecting to exchange their ideas and experiences with those from the other countries and areas. The better way to do this is, of course, face-to-face communication. It is the intention that we invite the scholars from all over the world to come to China.

In the past, academic organizations of many other countries have made great contributions to the international exchange activities, hosting the World Congress on Theory of Machines and Mechanisms for example. Being a large country, China should have made more efforts in this aspect. It is the senior Chinese researchers' dream that the World Congress on Theory of Machines and Mechanisms will have been held in China some day in the future. We do believe that hosting this Conference will act as a substantial step towards the realization of this dream.

The papers submitted to the conference cover a wide scope of interesting subjects, including kinematic analysis and synthesis of mechanisms, dynamics of machines, linkage and cams, gearing and transmission, robotics and manipulators, walking machines, micro-machinery, CAD of machines and other relevant topics.

On this occasion, We are particularly indebted to all people who rendered their help for the preparation of the Conference and the publication of the proceedings.

# Proceedings of MTM'97 Conference

## CONTENTS

### PREFACE

#### Keynote Lecture

Some remarks to history and future of tmm-practical applications .....	Kurt Luck (3)
Linkages and cams:teaching simple mechanisms,creating complex machines .....	Elisabeth Filemon (9)
A fin-de-siecle view of tmm .....	Jorge Angeles (13)
Design and manufacturing of variable pitch screw transmission mechanisms .....	Hongsen Yan (17)
Design education of a Japanese university past and now .....	Masana Kato (21)
New field of gearing-gears for micromechanisms .....	Teru Hayashi (26)

#### Kinematic Analysis and synthesis of Mechanisms

Type and kinematic analysis of plane linkages;CAD-system kam .....	E. E. Peisach S. A. N. Nazir (33)
Designing a platform type mechanism possessing three degrees of freedoms .....	
..... Akhtar Nawaz Malik Muhammad Rafique Khurshid Anwar (38)	
On the simple stationary configurations of movable spatial 6R linkages .....	Chung-ching Lee (41)
Binary identification and synthesis of mechanisms .....	Pierre Jacquet Marc Dahan (46)
Optimal parameters of agricultural machines mechanisms .....	Milan Veljić (51)
A note on the mathematization of kinematics of mechanisms in the 19th century .....	Teun Koetsier (56)
Optimum design with kinematics and dynamics simulation of a multi-bar telescopic mechanism for moving a stand structure .....	Heikki Marikka (61)
Construction solutions and optimization supporting construction of spreaders .....	
..... Zoran Merinkovic Radic Mijajlovic Miomir Jovanovic Danko Mijajlovic (64)	
The design and torque distribution of differential devices for full time four-wheel-drive vehicles .....	Longchang Hsieh (69)
Locomotion of caterpillars used for strapping or dragging mechanisms .....	Simona Mariana Cretu (74)
Analysis and application of indefinite freedom mechanism .....	Ma Luhong Shen Yu Yuan Huishan (78)
The numerical simulation of the operating processes for the combination mechanism of slider-crank and free piston .....	Long Zhengmin (83)
Synthesis for central crank-rocker mechanism according to allowable transmission angle .....	
..... Hou Muying Wang Ping Tian Yie (87)	
Synthesis of five-bar linkage with a controlled input link for the accurate generation of Multi-alternate functions .....	
..... Kong Jianyi W. Funk (90)	
Trochoid crank geneva combination mechanism synthesis .....	Han Jiguang (94)
Synthesis of chain looper mechanism of high-speed overlock industrial sewing machine .....	
..... Zhou Lihua Huang Tian Zeng Ziping Du Hengrui Lu Zhanjun (99)	
A unified curvature theory in planar,spherical and spatial motion .....	Wang Delun Xiao Dazhun (103)
The structural analysis of general linkage mechanism using type transformation theory .....	
..... Cao Weiqing Yan Tianhong Chu Jinkui (107)	
The computer automatic generation for the type synthesis of geared linkage mechanisms .....	
..... Li Tuanjie Cao Weiqing Chu Jinkui (111)	
A computer based framework for creative synthesis of mechanical devices .....	
..... Hou Yuemin Yang Runze Zhang Wei Bao Li (115)	
Topological presentation of kinematic chains based on the independent loops and its applications .....	
..... Li Shujun Quan Taiguo Du Liqun (120)	
Case based reasoning in knowledge-based mechanical conceptual design ... Zou Huijun Kong Fanguo Wang Shigan (123)	

<b>A preliminary study on a new approach to kinematic chain isomorphism identification .....</b>	Kong Fanguo Zou Huijun Wang Shigang (127)
<b>Approximate kinematic synthesis of planar four-bar linkage for path generation .....</b>	Liu Anxin Yang Tingli (131)
<b>Synthesis of guided chain drive mechanism with linkages .....</b>	Shan Baozhong Wang Yixing Chen Entao (136)
<b>Kinematic analysis of guided chain drive mechanism with linkages .....</b>	Wang Yixing Chen Entao Shan Baozhong (140)
<b>A new method for designing the threegear-four-bar mechanism .....</b>	Chen Peifang (143)
<b>The function synthesis, optimum design and dynamic simulation of the spatial four-bar linkage mechanism .....</b>	Zhang Mei Qu Jin (147)
<b>Intelligent support system for the kinematic design of mechanism .....</b>	Wang Zhixing Zhong Shisheng Guan Liwen Wu Qunbo (151)
<b>The fractal method of mechanism evolution .....</b>	Liu Chuanhe (155)
<b>Analysis and computer simulation on the mechanism of the 6-dof double platforms miller .....</b>	Wang Zhixing Wu Bo Zhang Jiaxin Li Jiansheng (160)
<b>Method of groebner bases for solving displacement analysis problem of mechanisms .....</b>	Li Li Chen Yong (163)
<b>Design methodology of energy saving mechanisms .....</b>	Wang Yuxin Ma Xiaoling Yan Xiangan (167)
<b>A new method for cad of dimension synthesis of planar linkage .....</b>	Li Xuerong (170)
<b>Research on orthogonal reinforcement centrifugal mechanism .....</b>	Zhong Kangmin Guo Peiquan Wang Zichang (173)
<b>kinematic analysis of a differential mechanism using iterative methods .....</b>	Han Wenzhong Fu Qun Ma Qiusheng (178)
<b>A new method to study spherical single-loop mechanisms .....</b>	Li Can Jia Yanling (182)
<b>Discussing analysis and synthesis of mechanisms with higher pairs by coordinates transformation theory .....</b>	Wang Hongshu Cheng Kai Xie Chun Wang Yong (185)
<b>Computer aided dimensional synthesis of pivot four-bar mechanis realizing linear displacement in instruments .....</b>	Qiu Jianxin Pan Yuxue Qin Rongrong (188)
<b>Analysis of spatial four-bar rcc mechanism .....</b>	Fang Shaoen (192)
<b>A general efficient new method of link group disassembling .....</b>	Liu Yuanwei Chang Yong (196)
<b>Knowledge and function-based visual mechanism synthesis method for mechanical kinematic scheme design .....</b>	Guan Liwen Wang Zhixing Zhong Shisheng Wu Qunbo (199)

## Dynamics of Machines

<b>Dynamic effects of using permanent magnetic bearing and magnetic fluid in linkage mechanisms .....</b>	Li Zhe B. S. Thompson (205)
<b>Supplement for research on the influence of height and speed of hoisting the load on dynamic behavior of a tower crane structure .....</b>	Davor Ostric Aleksandar Brkic Nenad Zrnic (209)
<b>Supplement for determination of the inclination path of gantry cranes .....</b>	Davor Ostric Nenad Zrnic Aleksandar Brkic (214)
<b>A note on the use of euler angles in rotodynamics .....</b>	Carlo Innocenti (218)
<b>Optimization of the dynamics of mechanisms by the use of active elements-theory and experiments .....</b>	J. Bormann H. Ulbrich (223)
<b>Computer modelling of the dynamics of the drive system of a car .....</b>	Kozimierz Romaniszyn Stanislaw Wojciech (227)
<b>Factorization method in bending vibrations of nonuniform beams .....</b>	Dimitru Caruntu (232)
<b>About the dynamics of the mechanisms with flexible elements .....</b>	Doina-Daniela Vatu (235)
<b>Dynamics of cam mechanisms with cams contoured by segments of circles .....</b>	Vladimir F. Krasnikov (237)
<b>Effect of different support bearing condition on rotor critical speed-experimentation and f. E. M. simulation .....</b>	A. Chatterjee A. K. Darpe (239)
<b>Dynamic analysis and experiment research on a mechanism for remote concrete spraying in shafts and tunnels .....</b>	Liu Hongzhao E. Appleton (243)
<b>The influence of friction and damping forces on dynamic loading at cranes .....</b>	Radic Mijalovic Zoran Marinkovic Miomir Jovanovic (248)
<b>Study on dynamic design and geometry of planar linkage .....</b>	Nobuyoshi Morita Bin Feng Takao Torii (254)
<b>Dynamic behaviour mechanical transmissions as non-holonomic systems .....</b>	Moidrag Zlokolica (258)
<b>Primary vibration analysis of single-sided corrugating machine system .....</b>	Zhou Shitang Wei Bing Zhang Qi An Hanggan (262)

<b>Sensitivity calculation of model parameters of transmission system</b>	Zhu Caichao Qin Datong Tan Zhangyi Han Xi	(266)
<b>Unbalance responses of a flexible rotor running in variable impedance journal bearings</b>	Fang Yuefa M. J. Goodwin P. J. Ogrdnik	(269)
<b>An improved dynamic model for the multiple-point meshing mechanism with flexible Support</b>	Su Zhixiao Liu Hongzhao Jiang Hong Cao Weiqing	(273)
<b>Harmonic response analysis for a multiple-point meshing transmission mechanism with flexible support</b>	Liu Hongzhao E. Appleton Zhang Shengning Su Zhixiao Cao Weiqing	(277)
<b>A parametric study on the elastic resonance of a spatial mechanism</b>	Yu Yueqing	(281)
<b>Optimal shaking force and shaking moment balancing of planar linkages</b>	Liu Anxin Yang Tingli	(286)
<b>Active control of random dynamic response for a class of intelligent mechanisms</b>	Tang Liwei Ma Wengui Zhang Ce Yang Yiping Lu Gangqing	(290)
<b>A force-oriented method in modelling the kinematic pairs in dynamic simulation of mechanisms</b>	Zhang Yi Cao Zhikui	(295)
<b>A mass moment substitution method for complete shaking force balancing of spatial linkages: Part 1-mass moment substitution</b>	Kong Xianwen Yang Tingli	(300)
<b>A mass moment substitution method for complete shaking force balancing of spatial linkages: Part 2-general procedure</b>	Kong Xianwen Yang Tingli	(305)
<b>A new method for optimization of dynamic balance of high-speed pickup camera in-and-out movement</b>	Pan Yuxue Zhang Shuren Shen Zhiyong Qiu Jianxin	(309)
<b>A new method to find analysis of planar linkages</b>	Wang Ziling Zhang Jian	(313)
<b>Dynamic analysis of autonomous steered robot vehicle</b>	Tong Keji Zhao Zhenlu	(317)
<b>Phase complex synchronization vibration system with quadr-motor drives</b>	Wen Bangchun Zhao Chunyu Fu Yao	(321)
<b>Workspace evaluation virtual axis machine tools</b>	Huang Tian Liu Baoshun Wang Jinsong D. J. Whitehouse	(326)
<b>Gyrobondgraph method for the dynamic simulation of flexible multibody systems in accelerating reference frames</b>	Wang Zhongshuang	(331)
<b>Gyrobondgraph method for the dynamic and static force analysis of flexible multibody systems</b>	Wang Zhongshuang Jiang Yuying	(335)
<b>A study on the dynamic characteristics of large-sized and complex mechanical structural system</b>	Yu Zhixin Zhang Lin Li Zhengxiao Yue Hongbin	(339)
<b>Relationship between supporting features and linkage mechanism of powered supports</b>	Kou Ziming Xu Buqin Shen Xianjun	(342)
<b>Vibration control of elastic linkage mechanisms using piezoelectric actuators/sensors</b>	Ren Jianting Qiu Yang	(346)
<b>Dynamics digital simulation of a new type long stroke pumping units</b>	Zhang Yongjun Tang Xiaoqiang Li Wenzhe	(350)
<b>The dynamic characteristic of inertia cone vibrating crushers</b>	Li Yinong Wen Bangchun Liu Shuying Liu Yongxi	(353)
<b>The inverse force analysis of a compliant four-bar mechanism with external force acting on a fixed point on the coupler</b>	Lin Han Liao Qizheng Liang Chonggao	(358)
<b>Control system design of active eardefenders</b>	Pan Jiaqiang Liu Yingshu Pan Jie	(362)

## Linkages and Cams

<b>General solution of three-position problem with unsharpened position</b>	Karl-Heinz Modler Song Lin	(369)
<b>Software for kinematics and dynamic analysis of linkages</b>	Rosendo Franco Rodriguez Jorge Moya Rodriguez	(374)
<b>On the mechanical errors in planar linkages</b>	Jae Kyun Shin Jin Han Jung	(378)
<b>Computer aided estimation of clearances at various joints of a four bar chain on the basis of non-zero wear</b>	J. P. Modak A. M. Kuthe	(383)
<b>An integrated system for total design of disc cams roller followers</b>	Daizhong Su	(389)
<b>Contributions to synthesis of the rotary cam and balance tappet mechanism</b>	Paul Autonescu Florian Petrescu Ovidiu Antonescu Daniela Antonescu	(393)
<b>A computer simulation of the motion of disc cam mechanisms with a complex profile</b>	Hristo Ivanovski Janko Jancevski Emilia Vetadzokoska	(397)

<b>Development of optimal design and parametric drawing software of the roller gear indexing cam mechanism driven unit</b>	.....	He Wei Cao Jujiang Suo Bingjuan Bian Naixin Peng Guoxun (401)
<b>The design of flexible linkage mechanisms fabricated from three-dimensional braided composite with optimal link properties</b>	.....	Cai Ganwei Liao Daoxun (405)
<b>Similar complex number principle of force analysis for the spatial linkages</b>	.....	Zhao Guowen Pan Yuxue Lu Zhiping Hou Jili Lu Guiying (409)
<b>Atlas of output properties of 5-bar double crank linkages and analysis</b>	.....	Chu Jinkwi Wu Xin Cao Weiqing (411)
<b>Study on globoidal indexing cam mechanism for a new type of controllable point engagement</b>	.....	Wang Qichao Tao Xueheng Xiao Zhengyang (415)
<b>Forward displacement analysis of the general 5-5 stewart platform</b>	.....	Lin Han Liao Qizheng Liang Chonggao (418)
<b>Function generator synthesis of planar linkage by equivalent mechanism</b>	.....	Huang Maolin Xie Min (424)
<b>Study on torque compensation of high-speed cam mechanism</b>	....	Meng Caifang Liu Huiguo Zhang Ce Dai Youmou (428)
<b>Synthesis of function mechanisms of four-bar linkage</b>	.....	Fu Yao Wen Bangchun Liu Yongxi (432)
<b>A new method for full shaking force balancing of planar linkages by a few finite positions</b>	.....	Zhang Ming Yang Tingli (435)
<b>The motional properties of five-bar linkages with dual-crank of identical angular velocity input</b>	.....	Yuan Jianxiong Lu Fanghui Li Jinliang Song Xin (440)
<b>Universal equations of globoid index cam and research of index precision</b>	.....	Qin Rongrong Hu Bingchen Yang Jiandong (444)
<b>Synthesis of planar three-component cam mechanism for guidance</b>	.....	Zhang Ming Shen Shide Xu Shangxian (447)
<b>Profile error analysis of rectilinear translating follower-barrel-cam</b>	.....	Zhang Yitong Lu Ling Yin Mingfu (452)
<b>A research on the computer-aided cam design and computer display of cam motion</b>	.....	Lu Mowu Zhang Fenglu (456)
<b>A new theory for designing conical cams</b>	.....	Feng Runze (459)
<b>Research on function law of stephenson-21 type six-link mechanisms</b>	.....	Dai Yuehong Huang Maolin (462)
<b>The new determination and method of the axle center region about the oscillation follower cam mechanisms</b>	.....	Xie Chun Sheng Kai Wang Hongshu (466)
<b>Study on symmetrical coupler curves of the planer linkages</b>	.....	Cao Qinglin Chen Jianping Shen Shide (468)
<b>Optimal function synthesis of geared four-bar mechanism and dynamic simulation of mechanism</b>	.....	Zhang Mei Diao Yan Hou Li (472)
<b>Research of inner parallel move gear mechanism</b>	.....	Zhang Chunlin Hu Ronghui (475)
<b>CAD/CAM system for circular enveloping worm drive</b>	.....	Yao Ligang Xu Fengping Li Shangxin Li Mingshan Li Huamin (478)
<b>Representation, identification and reconstruction of continuous planar curve with local parameters</b>	.....	Lan Zhaojun Wu Gangan Zou Huijun (481)
<b>The analysis for designing the minimum size disc cam mechanism whose roller follower move in general plane motion in accordance with the allowable pressure angle</b>	.....	Chang Yong Liu Yuanwei An Yongdong (485)
<b>The application of bond graphs in dynamic analysis of cam-follower system with two degrees of freedom</b>	.....	Li Chunshu Liu Bingqing Liu Guangsheng (488)
<b>A curvature function relating to a total rotational angle of the tangent of planar coupler curves</b>	.....	Lou Jin (491)

## Gearing

<b>Tooth contact of hypoid gears effected by position errors</b>	.....	V. Simon (497)
<b>The minimal individual and collective numeral of teeth by gear pairs</b>	.....	Dimitar Stamboliiev (502)
<b>Influences of ladder-shape factors on strength and stiffness of the double involute gear</b>	.....	Xu Hongbin Zhang Guanghui Masana Kato Deng Gang (506)
<b>Designing crowns for sugar cane mills</b>	.....	Moya Rodriguez J. L. Negrin Hernandez L. Fernandez Castaneda F. Goytisolo Espinosa R. Cabello Eras J. J. (510)
<b>Influence of tooth profile on lubrication</b>	.....	Goytisolo Espinosa R. Cabello Eras J. J. Moya Rodriguez J. L. Rosendo Franco Rodriguez (514)
<b>Lewis factor in gears with special geometry</b>	.....	Moya Rodriguez Jorge Laureano Rosendo Franco Rodriguez Goytisolo Espinosa Rafael (517)
<b>Machines for simulating contact in gears</b>	.....	Goytisolo Espinosa Rafael Cabello Eras Juan Jose Moya Rodriguez Jorge Laureano Rosendo Franco Rodriguez (520)

<b>Error effect on the load and stress of meshing gears with finite element method .....</b>	H. Long D. T. Qin G. H. Zhang R. Balendra (523)
<b>Research on the application of the method of tooth contact analysis at cylindrical worm gears .....</b>	Horia Vintila Gheorghe Miloiu Teodor Constantin (528)
<b>W-N gears: romanian research and applications .....</b>	Gheorghe Miloiu (533)
<b>Drive train design of redundant-drive manipulators .....</b>	Dar-zen Chen Kang-Li Yao Chih-hua Lin (539)
<b>Gear body shape methodical conception-important step on the occasion of optimal features gear train design .....</b>	Vladimir Andonovic (545)
<b>A kineto-elastodynamic model of a gear testing machine .....</b>	G. Dalpiaz A. Rivola R. Rubini (549)
<b>About influence of hydrodynamic factors to choice of a pressure angle .....</b>	G. A. Zhuravlev (554)
<b>Performance of thermoplastic poly-imide(tpi)gears at high temperature .....</b>	Ichiro Moriwaki Gong Donghui Tsuyoshi Hasegawa Fumio Oshino (559)
<b>Effects of design parameters on root stress of thin-rimmed helical internal gears with asymmetric web arrangement .....</b>	Satoshi Oda Kouitsu Miyachika Kouji Horikawa Akira sumitani (563)
<b>Designing of gearboxes family .....</b>	V. M. Tretiakov (569)
<b>Multicriterion optimization of planetary gears type aa .....</b>	Emilija Vetadjokoska (573)
<b>Influence of elemental errors and deformation on clearance between contact teeth of worm gearing .....</b>	E. L. Airapetov D Su T. N. Melnikova (577)
<b>Simulation of statical and dynamical loading in planetary berningbone gear transmissions .....</b>	E. L. Airapetov V. L. Aparkhov I. A. Beadny M. J. Leontiev (581)
<b>Geared electromechanical system dynamics simulation for optimum dimensioning of laser hardened gears .....</b>	H. Martikka H. Eskelinen (583)
<b>Measurement of helical gear using coordinate measuring machine .....</b>	Liu Zongxian Ken Yagi Hisashi Tamura Kazumasa Kawasaki (588)
<b>Finish hobbing of hardened gears with cerment-and cbn-tipped hobs .....</b>	Y. Ariura Y. Umezaki K. Shimamura Y. Kohno (593)
<b>Tooth surface modification method applicable to various types of worm gears .....</b>	Hidehiro Yoshino Yoshifumi Muta (598)
<b>Helixform method for cutting hypoid gears with modified tooth surface .....</b>	Keita IWAI Takehiro UMEKI Kazumasa KAWASAKI Hisashi TAMURA (603)
<b>Study on built-up houyglass worm hob .....</b>	Shinji YAMAMORI Yasukazu TETSUKA Hisashi TAMURA Kazumass KAWASAKI (608)
<b>Peculiarities of nonorthogonal spiroid gearing parametric synthesis .....</b>	V. I. Goldfarb E. S. Trubatchev (613)
<b>Vibration and accuracy of spiroid gears .....</b>	V. I. Goldfarb A. I. Abamov (617)
<b>Simulational analysis of the effects of productional errors in case of worm driving pairs .....</b>	Illes Dudas Karoly Banyai (620)
<b>Application of factorial experiment design method for analysis of worm gearing .....</b>	Gyula Varga Illes Dudas (625)
<b>Three dimensional measurement and design for analysis of worm gearing .....</b>	Illes Dudas Zsolt Bajaky (630)
<b>Recent advances in the analysis of spiral bevel gears .....</b>	Robert F. Handschuh (635)
<b>Some methods of formation of conjugated surfaces with two-point contact in meshing with arch-shaped teeth .....</b>	Yerikhov M. L. Syzrantsev V. N. (642)
<b>On a finite element method for dynamic contact properties of gearing .....</b>	Li Runfang Chen Bingkui (645)
<b>Distribution of bending stresses along the length of tooth in the catt cylindrical gear tooth at the tooth fillet .....</b>	Li Ying Zhao Xueyong (649)
<b>Experimental study on load-sharing performance of a planetary gear drive .....</b>	Cui Hongbin Yang Tienan (653)
<b>Technique and theory of embedded-strain-gage in meshing contact problems .....</b>	Wang shuren Li Guitao Li Xuzen (657)
<b>Analysis of elastohydrodynamic lubrication of plane re-enveloping hourglass worm gearing(part 1:finite length line contact ehl model and analysis).....</b>	He Huinong Wei Yunlong (660)
<b>New method for calculation tooth-root stress and tooth deflection of gears .....</b>	Feng shouwe Wang Shouyu Pu Lianggui Fang Zongde (664)
<b>Theoretical investigation on meshing vibration of w-n gearing .....</b>	Wu Baolin Meng Huirong Shao Jiahui Li Jinbao (668)
<b>Computer simulation of load contact and running-in of double circular-arc gears .....</b>	Sun Dale Yang Wentong Cai Chunyuan (672)
<b>Research and practice on separation of errors by numerical fitting .....</b>	Peng Donglin Liu Chengkang Liu Chong (676)

<b>The criterion to judge the power-flow type of the closed epicyclic gear train</b>	Zhou Xin Han Jiguang	(680)
<b>The optimum design of fuzzy reliability on the planetary gear drive with involute small teeth difference</b>	Zheng Wenlin Liu Wenzhong	(683)
<b>Study on the load distribution and the tooth load sharing of the rolling cone enveloping hourglass worm gearing</b>	Wang Jinge Deng Yuanchao Zhang Guanghui	(688)
<b>Identification of dynamic characteristics of gear transmission systems with rotary wings</b>	Shao Renping Sun Jincai Shen Yunwen Jia Purong	(693)
<b>Spatial elastic conjugation theory in harmonic drive</b>	Dong Huimin You Zhuping Liu Jian	(697)
<b>A new method for seeking the optimum gear tooth profiles-the theoretical basis of W-N gearing</b>	Ye Gang Ye xianyou	(701)
<b>The overlap coefficient and slide coefficient of mlsp gears</b>	Zhao Han Liang Jinhua Tian Jie Chen Anshi	(707)
<b>Geometrical analysis for inter-groove passage of the conjugate helical surfaces</b>	Xiao Dazhun Liu Dongtao	(710)
<b>Backlash distribution of conjugate helical surfaces</b>	Xiao Dazhun Jin xia	(713)
<b>Principle and analysis on the forming of cold rolling harmonic gears</b>	Lin Shuzhong Lu Yi Sun Huixue	(717)
<b>The design and study on the reliability of cycloidal gear</b>	Liu Bingqing Zhang Minglu Sun Lixin	(720)
<b>Optimum design of structural parameter of bogiflex drive system</b>	Wan Longjun Xu Yiqun Xu Xiangu	(724)
<b>A new method in measuring gear transmission system's dynamic performance--the infrared contactless collector ring</b>	Wang Xiaochen Zhu Chuanmin Tian Zhiren	(727)
<b>Comment on the <math>K_{IP}</math> calculation method of ISO 6336</b>	Li Zhaogan	(730)
<b>Application of solid modelling method in gear geometric analysis and gear manufacturing</b>	Chen Xiaoan Liang Xichang Zhan Jie	(734)
<b>A new measuring device for double enveloping toroidal worm gearing</b>	Xie Huakun Wang Cheng Zhang Xinming Wang Hong	(738)
<b>Analysis of worm wheel tooth surface equations in cylindrical worm drive with circular arc profile</b>	Jiao Jinjuan Cheng Fuan Zhang Zhaoliang Liu Shusen	(742)
<b>Tooth meshing analysis for helical gearing with double involute tooth profile</b>	Sun Dale Zhang Guanghui	(745)
<b>The research and design on gear pair of variable ratio steering-gear</b>	Zhang Zhenlin Dong Zhilin	(749)
<b>The research and application of high speed heavy duty double-circular-arc gear in petrochemical equipment</b>	Chen Yuan Yuan Hexiang Tao Ye Ma Runmei	(753)
<b>Study on the scuffing resistance of plasma nitrided gear</b>	Zhao Shaofu Chen Xiuyu	(756)
<b>Progress of mechanical walking wheel-A new running gear of vehicle for soft ground</b>	Chen Jiqing Yang Wenzhi Li Qiang	(758)
<b>The optimum design of the two-stage worm reducing gear</b>	Pan Zuoliang Bi Kexin Pan Chengyi	(761)
<b>Discussion for design of satellite gear trains</b>	Yang Ping	(764)
<b>Finite element analysis of straight and helical bevel gears(2nd report:load distribution and instantaneous stiffness)</b>	Li Jianfeng Wang Junxiao Zhang Ge Wang S. Y.	(768)
<b>Finite element analysis of straight and helical bevel gears(first report:theory)</b>	Li Jianfeng Zhang Ge Wang Junxiao Wang S. Y.	(772)
<b>Pinhole generating of pin gear housing</b>	Cui Zhengyun Liu Jiyan Zhang Tiecheng R. Henry	(776)
<b>Research and production of the zqdx series for point-line meshing cylindrical gear speed reducer</b>	Li Haixiang Wang Junrong Luo Qihan Liu Anjun Xi Weiguang Zhang Songou	(780)
<b>New numerical method for helical gear elastic contact problems</b>	Deng Qingxu Yang Wentong Cai Chunyuan	(783)
<b>Dynamic analysis of a circular-arc gear pair</b>	Zhu Hao Wu Xirang	(787)
<b>Dynamic simulation of the series assembly of non-circular gear and linkages by computer</b>	Sun Wenlei Ling Bo Bao Jun	(791)
<b>The fuzzy optimum design on straight-tooth bevel gear drive</b>	Li Guobin	(794)
<b>Development and application of two-angle rotator mechanism</b>	Chen Kunjie Ren Shijun	(797)
<b>The gear concurrent design method</b>	Tang Jinyuan Xiao Liming	(801)
<b>Research on cycloid roller planetary reducer</b>	Qu Zhigang An Zijun Jiang Shouhou Liu Fengxiang	(805)
<b>The study on drive property of 2K-H planetary train</b>	Jia Baoxian Bian Wenfeng Zhang Bo	(809)
<b>Correcting the heat-treatment deformation of plant generated hourglass worms based on deviation compensation</b>	Qin Datong Yan Jia Yang Yalian Xie Yong Masana Kato	(812)

<b>Large addendum modification gear used in bogiflex drive .....</b>	Xu Yiqun Wan Longjun Xu Xianggu	(817)
<b>A new method of calculating and measuring the hob profile of cycloidal gear .....</b>	Cao Cunchang	(820)
<b>Parameter optimization of planetary reducer in turning mechanism of automobile crane and formation of drawing .....</b>	Su Meng Zhao Can	(824)
<b>Meshing analysis method of harmonic drive with external wave generator .....</b>	Xin Hongbing He Huiyang Xie Jinrui	(828)
<b>The exact duplex helical method generated the spiral bevel gears-The calculating principle of the machine setting generated the pinion .....</b>	Wang Zhe Li Jun	(831)
<b>Experimental study of waved response in the spiral bevel gears used for aeroengines .....</b>	Wei wenshan Lin Jinshu Ding Jingyuan	(835)
<b>A new numerical method for the solution of helical gear thermal ehl problem .....</b>	Yu Tonghui Zhang Shusheng Li Jianfeng Jia Yi	(840)
<b>Fuzzy reliability analysis of bending fatigue strength of planetary gear transmission .....</b>	Li Wei Meng Huirong Wang Chunyan	(843)
<b>Computerized simulation of meshing and contact of plane-generated hourglass worm gearing .....</b>	Qin Dongxin Qin Datong Xie Yong Yang Yalian	(847)
<b>Optimal design of double-circular-arc gear sets .....</b>	Fan Zhimin Li Jinbao Zhang Guanhui	(852)

## Robots, Manipulators and Walking Machines

<b>An error-coefficient for optimum design of a parallel manipulator by two different procedures .....</b>	Shaochi Wang Hiromitsu Hikita Naohiko Hanajima Mitsuhsisa Yamashita	(857)
<b>Real-time nurbs trajectory generation for a robot using an open-architecture controller .....</b>	Qiyi G. Zhang R. Bryan Greenway	(862)
<b>Laser machines and laser-robots for cutting thin sheet .....</b>	Miroslav Radovanovic Dragoljub Lazarevic	(867)
<b>Dynamic characteristics and disbalances identification of flexible rotors .....</b>	Vilen Roizman	(871)
<b>A generic kinematic model for walking machine leg design .....</b>	Zhang S. J. Sanger D. J. Howard D.	(876)
<b>The sensitivity of the static workspace of walking machines to their operational environment .....</b>	Howard D. Sanger D. J. Zhang S. J.	(881)
<b>Study on estimation of muscular fatigue in human motion .....</b>	Toshiomi Fukata Takayuki Aiurua Guiming Rong Hiroyuki Kisu	(886)
<b>Contributions upon the structural-kinematic modelling of a six-legged walking robot .....</b>	Nicolae Dumitru Mirela Cherciu	(891)
<b>Real-time actual pose determination of the general fully-parallel spherical wrist .....</b>	Vincenzo PARENTI-CASTELLI Raffaele DI GREGORIO	(895)
<b>Multifinger robotic gripper .....</b>	Abdul Ghafoor Mahmood A Khan Khalid Maqbool	(900)
<b>Dynamical commander algorithms of the industrial robots .....</b>	Ion Dinu	(902)
<b>Experimental determination of frequency response characteristics and dynamics loading in spur gears .....</b>	E. L. Airapetov O. I. Kosarev	(905)
<b>Study of the kinematics equivalency of series-parallel mechanism .....</b>	You Bo Zhang Yongjun Zhao Mingyang	(908)
<b>How to move a mobile robot around a corner .....</b>	Li Xiuzhen Wang Yongji	(912)
<b>Reverse displacement analysis of triple-octahedron variable geometry turss manipulators .....</b>	Xu Liju Yang Suixian	(917)
<b>Instantaneous motion of puma 760 industrial robot at special configurations .....</b>	Wang Jing Huang Zhen Zhu Wenbo	(921)
<b>The study on the kinematic model for a wheeled mobile robot .....</b>	Zhang Minglu Peng Shangxian Zhao Xiaosong	(925)
<b>Dynamic stability analysis of planar manipulator system .....</b>	Zhang Xianmin Liu Jike	(929)
<b>Dynamic load carrying capacity and optimal load distribution of dual-arm robots .....</b>	Chen Guofeng Liu Yan	(933)
<b>An auto-alternative tool kit of underwater executive system .....</b>	Zhang Lixun Wang Xiaodong Wang Liquan Meng Qixin Wang Haixia	(937)
<b>The research of a new type of parller mechanism .....</b>	Fan Limin Liao Qizheng Liang Chonggao	(940)
<b>Wu method for forward displacement analysis of the planar parallel manipulator .....</b>	Lin Han Liang Chonggao Zhang Yu	(945)
<b>Research into the workspace of a 6-dof double platforms miller .....</b>	Li Bing Wang Zhixing Liu Wentao Li Jiansheng	(949)

<b>The bilateral master slave manipulator system with different configurations in underwater work</b>	.....	Wu Wei Meng Qingxin (954)
<b>A study of kinematic performance of walking wheel under floating drive state</b>	.....	Liu Dawei Ning Sujian Chen Bingcong Peng shangxian Zhang Honggang (957)
<b>A novel prehensor with shape and force self-adaption</b>	.....	Hao Zhixiu Shen Yongsheng (961)
<b>Research on task-oriented optimal grasping plan by multifingered robot hands</b>	.....	Tian Zongjun Qian Ruiming Wu Kejian (965)
<b>The novel approach for the optimal dynamic loads distribution of multiple cooperating manipulators</b>	.....	Zhao Yongsheng Du Yonghui Zhao Tieshi Huang Zhen (970)
<b>Impactless bipedal walking and dynamic simulation</b>	.....	Meng Yunhung Fu Xiangzhi (974)
<b>Energy consumption analysis of long-horned beetle walking in tripod gait</b>	.....	Du Yonghui Zhao Yongsheng Huang Zhen (978)
<b>A new converse calculation for robot computer emulation</b>	.....	Zhang Yongjun Yo Bo Bi Liyun (981)
<b>The optimization of rcc parameters by neural dynamics</b>	....	Wang Gang Guo Dong Chou Wusheng Peng shangxian (983)
<b>A newly structured six-axis wrist force sensor for underwater robot</b>	.....	Wang Wei Zhang Lixun Wang Lan Meng Qingxin Zhang Xiaodong (986)
<b>Research on the working mechanism of underwater robot crawling along pipe</b>	.....	Li Guangjun Wang Liquan Wang Qiming Meng Qingxin (989)
<b>Research about flexible joints finger of a prehensor</b>	.....	Hao Zhixiu Shen Yongsheng (992)
<b>A control scheme of combined method for redundant manipulators</b>	.....	Zhao Jing Bai Shixian (996)
<b>An analysis of the hexa structure</b>	.....	Dong Boru Yao Yanan (999)

### CAD of Machines and Mechanisms

<b>Computer aided technique for the design of hydrodynamic bearings</b>	.....	M. M. A. Shahin (1005)
<b>Intelligent integrated system for the design of power transmission systems</b>	.....	Daizhong Su Mark Wakelam (1010)
<b>Control research of parallel movement of machines applying the microprocessors</b>	.....	Miomir Jovanovic Radic Mijalovic Miodrag Arsic Dragan Denic (1015)
<b>Automated symbolic modelling for evaluation of design alternatives</b>	.....	Tan Runhua Chen Ying (1020)
<b>The study and design of clocks and watches cad system based on intelligence engineering</b>	.....	Duan Guolin Cha Jianzhong Lin Jianping Lu Yiping Weng Qizhe (1023)
<b>A design system model of machine part based on artifical neural network</b>	.....	Chen Bingkui Wang Dehua Lin Tengjiao (1027)
<b>Development of the computer-aided frame design(CAFD) system of water chiller</b>	.....	Dai Yuchong (1030)
<b>Researching on theoretical problems of mechanical creative design</b>	....	Shen Hui ping Ge Letong Zhang Guozhang (1034)
<b>Machine tool main drive system cad</b>	.....	Sun Yongguo Ba You Guan Xuezhi Xu Wanli (1037)
<b>A study of geometric parametrization for curved surface medelling in the cad system of contour design</b>	.....	Sun Lanfeng Zhang Chenghai (1041)

### Others

<b>Improved measuring method for motion of a ball in ball bearings</b>	.....	Kazuaki Kawakita Kazuki Takenouchi Tomoaki Fuji Shogo Ariyoshi (1047)
<b>A new measuring method for motion accuracy of nc machine tools using a double-bar linkage</b>	.....	Qiu Hua (1051)
<b>Development of experimental system for thrust ball bearings</b>	.....	Tomoki Fuji Kazuaki Kawakita Kazuki Takenouchi Shogo Ariyoshi (1056)
<b>Measuring characteristics and motion of a ball in thrust ball bearings</b>	.....	Kazuaki Takenouchi Kazuaki Kawakita Tomoki Fuji Shogo Ariyoshi (1060)
<b>Full traction characteristics of lubricant and their applications</b>	.....	Gang Deng Masana Kato Kohshiro Kato Katsumi Inoue (1065)
<b>Defining the portal crane hit force against the buffers and calculation of sprung buffers</b>	.....	Slobodan Tosic (1069)
<b>Rapid prototyping</b>	.....	K. H. Floerkemeier Jueqin Yang (1074)
<b>Design proposal for a new type of clutches essential for process machines with manually energised flywheel motor as an energy source</b>	.....	J. P. Modak J. T. Pattiwar S. K. Gupta S. G. Tarnekar R. A. Khan (1078)

<b>The total solidification time of plateshaped steel castings</b>	Martina Mazakova Jiri Hlousek (1083)
<b>Comparison of some bicycle drive mechanisms designed in the light of transmission angle optimization &amp; J. Papadopoulos hypothesis-part 1</b>	J. P. Modak S. D. Moghe (1087)
<b>Tribology in polymeric coated driveline slip splines:finite element analysis,fault and reliability tests</b>	Nunzio D'addea Luigi Giannotti Enrico Gargano (1091)
<b>Contribution to the improvement of the service system performance using active (intelligent) elements of the system</b>	Djordje Zrnic Srdjan Bosnjak (1096)
<b>Torsion disc pendulum as measuring device shear modulus</b>	Suryanto Sugeng Aryono (1101)
<b>Analysis of pressures,forces and torsion moments on the rollers while profiling steel sheet into the trough shapes</b>	Dragoljub Lazarevic (1105)
<b>Experimental study on the traction drive in reciprocating motion</b>	Koshiro Kato Niu Yongsheng (1110)
<b>Modified influence coefficient balancing method for imbalance correction of engine crankshafts</b>	Kang Yuan Sheen Gwojuh (1115)
<b>Mechanical performance of v-ribbed belts</b>	D. Q. Yu T. H. C. Childs K. W. Dalgarno S. M. Tabatabaei (1121)
<b>Graph synthesis of transmission patterns of multi-freedom epicyclic change gear boxes</b>	Zhang Weishe Wang Shouyu Yang Xiaoan (1126)
<b>Analysis of strength of equidistant profile connection with finite element method</b>	Zheng Youyi Shen Huifen Yang Yetian (1130)
<b>Dynamic analysis of performance of high-speed roller bearings</b>	Zhang Chengtie Chen Guoding Li Jianhua (1134)
<b>A fast approach to the numerical solution of line contact elastohydrodynamic lubrication with heavy load</b>	Li Wei Wang Chunyan Chang Shan Chen Chenwen (1138)
<b>Sensitivity of eigenvalues and eigenvectors of mechanical systems with respect to a design variable matrix</b>	Zhang Yimin Wen Bangchun Liu Qiaoling (1141)
<b>Nonlinear research on the vibration system with time depended mass collision</b>	Wang Shulin Hu Yiqing Gao Qiuzhi Yang Youngchun Liu Meiqing (1144)
<b>The study on real-time correction to abbe error of ill-abbe-principle's structures</b>	Xie Guangping Fang Chuichang Dai Gaoliang Yin Chunyong (1149)
<b>A class of forming mechanism with force constrain</b>	Huang Xiaocheng Liao Daoxun (1153)
<b>Optimal design for kinematics paramaters of the mechanical variable speed driver</b>	Shen Minde Liu Xingguo (1156)
<b>Screw transmission mechanism of tapered roller tooth nut</b>	Wen Zhengzhong Fan Shuncheng Ren Zhichun Huang Xinmei (1159)
<b>Research on regularity of stress distribution about isometric profile shaft controlled by cambered load</b>	Wang Desheng Lin Jinde Li Gaozheng (1162)
<b>Research on closed power of cycloid steel ball transmission</b>	An Zijun Qu Zhigang Lin Shuzhong Liu Fengxiang (1166)
<b>Study on sensitivity and stability of the oil film speed clutch</b>	Zhang Mingcheng Jin Guoguang Cen Shaoqi Guo Hong (1169)
<b>The design of a continuously variable transmission of hydromechanical type</b>	Gao Guosheng Guo Jingbo Lai Diquan (1172)
<b>Analysis for the characteristics of multiple range hydromechanical transmission(mhmt)</b>	Guo Jingbo Sha Mingyuan Gao Guosheng Lai Diquan (1176)
<b>Design,optimization and simulation for the mechanism of movable satellite ground antenna tracking system</b>	Hu Ping Wan Fuan Liang Chonggao Liao Qizheng (1179)
<b>Research on feeding mechanism for noncircular sectional turning</b>	Deng Zhongliang (1182)
<b>Quality control in mechanical system design</b>	Qin Wei Liu Wei Huang Maolin (1186)
<b>The thermal parameters simulation and cad of friction clutch</b>	Hou Shujun Chen Yushu Zheng Huiping (1190)
<b>A study on the structure and optimum parameters of high-speed fixed thrust bearings</b>	Dong Gang Shen Zhaoguang Xiang Zhongxia Bu Yan (1194)
<b>Transitions in the wear and friction of c/cu composite material sliding against the steel 45#</b>	Xiang Zhongxia Che Jianming Dong Gang Bu Yan (1198)
<b>A study on a new metal zirconium replacement for lead as ep-additive in lube oil</b>	Yu Jihou Yu Huili Wang Yanmin Che Chengbin(1201)

# **KEYNOTE LECTURE**

