

## Resúme

### Brief Introduction:

Lu Minxu, Male, was born in May 28, 1954. He was awarded Ph.D. in 1992 and was promoted to professor in 1994. Now, he is the professor and vice-president of Tubular Goods Research Center of CNPC, China. He is also the executive director of the Board of Directors of Chinese Society of Corrosion and Protection. He has published over 120 papers in English or in Chinese and authored 4 books. His research fields mainly focused on: CO<sub>2</sub> corrosion and flow induced corrosion in oil and gas field, remaining strength assessment and remaining life prediction for oil and gas pipeline, corrosion fatigue and stress corrosion cracking.

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### Education:

1988-1992 Northwestern Polytechnical University, Xi'an, P.R. China. Studied for a Doctor's degree, majored in corrosion fatigue of metallic material. The title of doctoral dissertation is "Comprehensive Investigation of Corrosion Fatigue Behaviors for Ultra-High Strength Steel".

1982-1985 Beijing University of Aeronautics and Astronautics, Beijing, P.R. China. Studied for a Master's degree, Majored in metallic materials fatigue. The special research direction is in microcomputer application and small fatigue crack behavior. The title of dissertation is "The numerical Analysis of Electrical Potential Field for CT Specimen and Microcomputer Aided Measurement System for Fatigue Crack Propagation Rate"

1978-1982 Beijing University of Aeronautics and Astronautics, Beijing, P.R. China. Studied for a Bachelor's degree, majored in metallic materials science and engineering.

### Experience:

April 1994 — present Professor and vice-president of Tubular Goods Research Center of CNPC. Research work focused on CO<sub>2</sub> corrosion and flow induced corrosion; remaining strength assessment and remaining life prediction for oil and gas pipeline.

Nov. 1986 —April 1994 Associate Professor of Department of Materials Science and engineering, Northwestern Polytechnical university(NPU). Research work mainly focused on corrosion fatigue for aircraft materials.

## Publication List:

### 1. Chinese Publications:

- 1) Lu Minxu and Zheng Xiulin. Overloading behavior of corrosion fatigue crack initiation for 300M steel. *Acta Metall. Sinica* 29(11), B496-B503(1993)
- 2) Lu Minxu, Liu Xiaokun, Wang Jianjun, Fui Xiangjong, Zheng Xiulin. Effect of heat treatment on crack propagation rate of GC-4 steel from corrosion fatigue of stress corrosion in various media. *Acta Metall. Sinica* 27(6), B403-B409(1991)
- 3) Lu Minxu, Zheng Xiulin, Deng Yanping, Wang Jianjun and Liu Xiaokun. The effect of polarization potential on corrosion fatigue crack propagation in GC-4. *J. Chinese Soc. Corros. Prot.* 13(1), 35-40(1993)
- 4) Lu Minxu, Deng Yanping, Zheng Xiulin, Liu Xiaokun and Wang Jianjun. The effect of temperature on corrosion fatigue crack propagation in GC-4 ultrahigh strength steel. *J. Chinese Soc. Corros. Prot.* 13(1), 41-46(1993)
- 5) Lu Minxu, Liu Xiaokun, Wang Jianjun, Fu Xiangjong and Zheng Xiulin. Effects of waveform and frequency of cyclic loading on corrosion FCP for GC-4 steel in 3.5% NaCl solution. *Acta Aeronautica et Astronautica Sinica* 14(1), A49-A55(1993)
- 6) Lu Minxu and Zheng Xiulin. Microcomputer aided monitor and measurement of corrosion fatigue crack initiation. *J. Chinese Soc. Corros. Prot.* 13(4), 373-379(1993)
- 7) Lu Minxu, Wang Rong and Zheng Xiulin. Measurement and investigation of behavior of chemical short crack of ultra-high strength steel. *J. Chinese Soc. Corros. Prot.* 13(4), 317-326(1993)
- 8) Lu Minxu, Liu Xiaokun, Wang Jianjun and Zheng Xiulin. Effect of liquid viscosity induced crack closure on corrosion fatigue. *J. Chinese Soc. Corros. Prot.* 14(1), 1-7(1994)
- 9) Lu Minxu and Zheng Xiulin. Corrosion fatigue small crack growth behavior and its overloading effect for 300M steel. *J. Chinese Soc. Corros. Prot.* 14(1), 13-24(1994)
- 10) Lu Minxu and Zheng Xiulin. Effects of stress ration and loading frequency on corrosion fatigue crack growth behavior for GC-4 steel. *J. Chinese Soc. Corros. Prot.* 14(2), 95-105(1994)
- 11) Lu Minxu and Zheng Xiulin. A model of hydrogen evolution and transport at crack tip for describing the effect of waveform on corrosion fatigue and the experimental verification thereof. *J. Chinese Soc. Corros. Prot.* 14(4), 255-264(1994)
- 12) Lu Minxu and Zheng Xiulin. Effects of overloading on corrosion fatigue crack growth for ultra-high strength steel----I. Quantitative model and prediction. *J. Chinese Soc. Corros. Prot.* 14(3), 192-199(1994)
- 13) Lu Minxu and Zheng Xiulin. Effects of overloading on corrosion fatigue crack growth for ultra-high strength steel----II. Experimental verification analysis. *J. Chinese Soc. Corros. Prot.* 14(3), 200-206(1994)
- 14) Lu Minxu and Zheng Xiulin. Effects of environment and stress ratio on corrosion fatigue crack initiation for 300M steel. *Acta Aeronautica et Astronautica Sinica*, 15(3), 378-382(1994)
- 15) Lu Minxu, Wang Jianjun, Liu Xiaokun and Zheng Xiulin. The BEM analysis for the influence of pin on FCP potential measured accuracy. *J. Exp. Mech.* 8(1), 45-52(1993)
- 16) Lu Minxu, Lu Baotong and Zheng Xiulin. A new LTFPCR measurement system by using microcomputer. *Acta Aeronautica et Astronautica Sinica*, 13(6), B339-B343(1992)
- 17) Lu Minxu, Zheng Xiulin and Qin Xiongpu. Progress in research on model of mechano-chemical interaction in corrosion fatigue. *J. Chinese Soc. Corros. Prot.* 11(3), 197-208(1991)
- 18) Lu Minxu, Liu Xiaokun, Wang Jianjun and Zheng Xiulin. Microcomputer aided measurement and analysis of corrosion fatigue crack propagation. *Acta Aeronautica et Astronautica Sinica*, 11(12), B617-B621(1990)
- 19) LU Minxu, Zheng Xiulin, Wang Jianjun and Liu Xiaokun. On effect of dowel contact with hole on measuring accuracy of electrical potential method with boundary element method. *Acta Aeronautica et Astronautica Sinica*, 14(10), B533-B556(1993)
- 20) Lu Minxu. Mechano-chemical couple effect of corrosion fatigue and its application. In conference proceeding of "On future development of mechanical science and technology-----forum of Young Scientists in Mechanical Science and Technology organized by Chinese

Natural Science Foundation in 1993

- 21) Lu Minxu, Liu Xiaokun, Wang Jianjun and Zheng Xiulin. Microcomputer aided D.C. potential method for measuring corrosion fatigue crack propagation rate. *J. Experimental Mech.* 6(2), 197-201(1991)
- 22) Lu Minxu, Wang Chunsheng and Jiang Weizhi. Analysis of optimum method of electrical potential measurement in CT specimen. *Mechanics and Practice* 11(3), 51-54(1989)
- 23) Lu Minxu Wang Rong and Zheng Xiulin. On temperature effect and physical mechanism of CF crack growth of ultra-high strength steel. *J. NPU*, 10(3), 185-292 (1992)
- 24) Lu Minxu, Lu Baotong, Li Tao and Zheng Xiulin. A new microcomputer aided system for measuring low temperature fatigue crack propagation rate. *J. NPU*, 10(1), 53-59(1992)
- 25) Lu Minxu and Zheng Xiulin, Prospects of microcrack and small crack research of ceramic materials. *J. NPU*, 9(3), 326-333(1991)
- 26) Lu Minxu. Capability and design consideration of a new fatigue crack propagation measurement system using microcomputer. *J. NPU*, 8(3), 343-350(1990)
- 27) Lu Minxu. Microcomputer aided fatigue crack propagation rate measurement in the near-threshold region. *J. NPU*, 7(3), 199-308(1989)
- 28) Lu Minxu and Jiang Weizhi. The current density method for searching after optimum scheme of electrical potential measurement. *Mechanical Strength.* 12(3), 40-43(1990)
- 29) Lu Minxu. Progress of chemically short crack research. *Mechanical Strength.* 11(2), 13-19(1989)
- 30) Lu Minxu, Xiao Xinran and Jiang Weizhi. The electrical potential analysis of cracked compact specimens. *J. Beijing Institute of Aeronautics and Astronautics* (1, Sum. 32), 105-112(1985)
- 31) Lu Minxu and Xu Huifang. Microcomputer aided fatigue threshold testing by K-decreasing and K-increasing method. *J. Data Acquisition and Processing* 4(1), 17-25(1989)
- 32) Lu Minxu, Jiang Weizhi and Wang Chunsheng. Apple-II microcomputer fatigue crack propagation date acquisition and processing system. *J. Data Acquisition and Processing* 3(2), 34-44(1988)
- 33) Lu Minxu and Zheng Xiulin. Progress in research on small crack ceramic materials *Ordnance Mater. Sci. Engng.*, 13(7), 5-15(1990)
- 34) Lu Minxu and Wang Rong, Wang Hong and Zheng Xiulin. Effect of temperature on corrosion fatigue growth rate and fractograph texture for GC-4 steel. *Engng. Mater.*, 156-120(1992)
- 35) He Zexia, Lu Minxu and Zheng Xiulin. Measurement and analysis of stress corrosion cracking behavior of ceramic materials. *J. Chinese Ceram. Soc.* 21(5), 451-456(1993)
- 36) Wang Rong, Lu Minxu and Zheng Xiulin. Quantitative expression of corrosion fatigue crack propagation for high strength aluminum alloy. *Acta Solid Mechanica Sinica*, 14(S. Issue), 28-32(1993)
- 37) Wang Rong, Lu Minxu and Zheng Xiulin. Crack propagation and life prediction under corrosion fatigue. *Acta Aeronautica et Astronautica Sinica* 14(3), A188-A192(1993)
- 38) Lu Baotong, Lu Minxu, and Zheng Xiulin. An experimental study on low temperature fatigue crack initiation of metals from notches by a microcomputer aided potential drop measurement system. *J. Exp. Mech.* 6(3), 303-310(1992)
- 39) Liu Daoxin, Lu Minxu, He Zexia, Qi Ji and Zheng Xiulin. Growth and Coalescence of small crack on glass surface. *J. NPU* 10(3), 303-310(1992)
- 40) He Zexia, Lu Minxu, Liu Daoxin, Qi Ji and Zheng Xiulin. Measurement and analysis of the SCC characteristics for soda-lime-silica glass. *J. NPU* 10(3), 311-317(1992)
- 41) He Zexia, Lu Minxu, Wang Renze and Zheng Xiulin. Cracks preparation of ceramic and its application in  $K_{IC}$  measurement. *Ordnance Mater. Sci. Engng.* 16(2), 57-60(1993)
- 42) Wang Jianjun, Liu Xiaokun and Lu Minxu. The calibration of electrical potential of standard CT and TPB specimens using boundary element method. *Acta Aeronautica et Astronautica Sinica* 9(13), S141-S143(1998)
- 43) Jiang Weizhi, Wang Chunsheng and Lu Minxu. The electrical potential of CT specimen and its application in crack extension. *Acta Aeronautica et Astronautica Sinica* 7(4), 412-416(1986)
- 44) Liu Xiaokun, Wang Jianjun and Lu Minxu. Influence of isothermal treatment on SCC and CF behavior of 40CrMnSiMoVA ultra-high strength steel. *J. Chinese Soc. Corros. Prot.* 13(2),

- 189-193(1993)
- 45) Liu Xiaokun, Wang Jianjun and Lu Minxu. Analysis of hydrogen diffusion in specimen with crack by using boundary element method. *J. Chinese Soc. Corros. Prot.*13(3), 206-212(1993)
  - 46) Liu Xiaokun, Wang Jianjun and Lu Minxu. Fu Xiangjiong and Jin Shi. Numerical simulation of hydrogen concentration distribution near crack tip under mode I loading. *J. NPU* 11(2), 233-238(1993)
  - 47) Wang Jianjun, Liu Xiaokun and Lu Minxu. The compliance analysis of compact tension specimen using boundary element method. *Mechanical Strength* 11(1), 53-56(1989)
  - 48) Wang Jianjun, Liu Xiaokun and Lu Minxu. Calibration of electrical potential for compact tensile specimen by using boundary element method. *Strength and Environment* (2, Sum 66), 50-50(1988)
  - 49) Liu Xiaokun, Wang Jianjun, Lu Minxu Fu Xiangjiong and Jin Shi. An analysis of hydrogen diffusion process in metals by boundary element technique, *J. Xi'an Petroleum Institute* 7(1), 24-29(1992)
  - 50) Wang Jianjun, Liu Xiaokun, Lu Minxu and Wang Haiyan, An analysis of corner effect in boundary element method, *J. Xi'an Petroleum Institute* 6(1), 21-26(1991)
  - 51) Liu Xiaokun, Wang Jianjun, Shao Shuyuan and Lu Minxu. Distribution of electrical potential and current in electrolyzer using boundary element method. *Modern Planting* (3)(1998)
  - 52) Liu Xiaokun, Wang Jianjun, Lu Minxu, Fu Xiangjiong and Jin Shi. The effect of yield stress on corrosion fatigue behavior of 40CrMnSiMoVA ultra-high strength steel. *Mater. Sci. Tech.*, 2(2), 1-5(1994)
  - 53) Wang Fenghui, Lu Minxu and Zheng Xiulin. Research progress of cyclic fatigue for ceramic materials. *J. Northwestern Polytechnical University*, 13(2), 213-216(1995)

## 2. English

## Publications:

- 1) Lu Minxu and Zheng Xiulin. A new microcomputer aided system for measuring FCP threshold and selecting test parameters. *Engng. Fracture Mech.* 45(6), 889-896(1993)
- 2) Lu Minxu, Liu Xiaokun, Wang Jianjun, Fu Xiangjiong and Zheng Xiulin. Effects of heat treatment and environment on crack propagation rate in steel GC-4 under corrosion fatigue and stress corrosion. *Acta Metall. Sinica (English Edition)* 5B(3), 183-189(1992)
- 3) Lu Minxu, Liu Xiaokun, Wang Jianjun and Zheng Xiulin. Effects of waveform and frequency of cyclic loading on corrosion FCP for GC-4 steel in 3.5% NaCl solution, *Chinese J. Aeronautics*, 7(1), 67-76(1994)
- 4) Lu Minxu, Zheng Xiulin and Wang Hong. Effects of overloading on corrosion fatigue crack propagation for GC-4 ultra-high strength steel. Submitted to *Engng. Fracture Mech.* For publication
- 5) Lu Minxu, Wang Rong and Zheng Xiulin. Comparison of the effects of temperature on corrosion fatigue crack growth and difference of the physical mechanism between in two common used corrosive environments for ultra-high strength steel. Submitted to *Engng. Fracture Mech.* For publication
- 6) Lu Minxu and Zheng Xiulin. Effects of stress ratio and frequency on the behaviors of corrosion fatigue crack growth of GC-4 steel. Submitted to *CORROSION* for publication
- 7) Lu Minxu and Zheng Xiulin. Capability and design consideration of a new microcomputer aided fatigue crack propagation measurement system. Submitted to *J. Test. Evaluation* for publication
- 8) Lu Minxu, Lu Baotong, Li Tao and Zheng Xiulin. A new microcomputer aided system for measuring FCP rate at low temperature based temperature compensation inverse electrical potential method. Submitted to *Exp. Mech.* For publication
- 9) Wang Fenghui, Lu Minxu, Wei Jianfeng and Zheng Xiulin. Effect of notches and environments on cyclic life of alumina. *J. Mater. Sci. Tech.*, 11(6), 1995
- 10) Wang Fenghui, Lu Minxu and Zheng Xiulin. Fracture of SiC tubes under tension/torsion accepted for publication by *Int. J. Fract.*
- 11) Wang Fenghui, Zheng Xiulin and Lu Minxu. Fracture criterion of ceramics under polyaxial tension stress. *Int. J. Fract.*, 68, R85087, 1994
- 12) Wang Fenghui, Zheng Xiulin and Lu Minxu. On the strength of ceramics with cavities. *Int. J. Fract.*, 70(1), 1995

- 13) Wang Fenghui, Zheng Xiulin and Lu Minxu. Notch strength of ceramics and statistical analysis. Engng. Fract. Mech. (in press)
- 14) Lu Minxu, Zhang Yufang and Li Helin. Development and application of ecomaterials in oil and gas industry. In Proceedings of International Ecomaterials Conference 163-166, Xi'an, China, 1995
- 15) Wang Fenghui, Zhang Xingan, Lu Minxu and Zheng Xiulin. High-temperature fracture behavior of notch alumina specimens. In Proceedings of Japan-Sino HTSM Conference, P67-69, Nagaoka Japan, Aug., 1995
- 16) Wang Fenghui, Lu Minxu and Zheng Xiulin. Statistical approach to dynamic fracture of brittle materials. In Proceedings of FEFG'94 Conference, Xi'an, China, 1994

Books:

- 1) Lu Minxu, Chapter 14, "mechanical behavior of ceramic material", in "mechanical behavior of material", Ed by Zheng Xiulin et al, Northwestern Polytechnical University Press, 1991
- 2) Lu Minxu, "Principle and method of microcomputer aided measurement of crack propagation", Teaching book for seminar on microcomputer aided measurement of crack propagation, Aug. 1988
- 3) Lu Minxu, "corrosion fracture and Failure Analysis", Teaching book, China Research and Education Center of Plant Engineering, Aug. 1989
- 4) Lu Minxu, "Corrosion Fatigue of Ultra-High Strength Steel", waited for publication in NPU press

Foundations and Other Research Projects:

As a person in Charge, to date, I have undertaken and been responsible for more than ten scientific research projects, nine of them having been completed. These projects include five science foundations, four important national grade research projects in advance, and two important research projects sponsored by CNPC.

- 1) "Mechano-chemical model and life prediction model for corrosion fatigue under load amplitude varying conditions" supported by Huo Yingdong Educational Foundation for Excellent Young Teacher of Colleges and Universities in 1993.
- 2) "Investigation of crack tip environment and chemically short crack" sponsored by China National Natural Science Foundation Committee under grant 59075234 in 1990
- 3) "Research on chemically small crack under corrosive environment" sponsored by China Aeronautics Science foundation Committee under grant 88g53016 in 1988.
- 4) "Physical essence and overcoming way of environment embrittlement of intermetallics" sponsored by China Aeronautics Science Foundation Committee under grant 93G53426 in 1993
- 5) "Research on the evolution law of small crack of ceramic materials and its measurement method: supported by China Aeronautics Science Foundation Committee under grant Q89G5301 in 1989

In addition to these five foundations, as a person in charge, I have also accomplished other four important national grade research projects in advance sponsored by China Defense Science and Industry Committee from 1990 to present, of which three projects are related with corrosion and corrosion fatigue of metallic materials. And now, I have been undertaking the two important research projects sponsored by CNPC, which is mainly focused on corrosion remaining strength evaluation and corrosion remaining lifetime prediction for pipeline materials.

Prizes:

Up to now, I have been awarded five various prizes for scientific and technological progress, four as the first prizewinner and one as the third prizewinner.

- 1) The achievement “ Comprehensive Behavior of Corrosion Fatigue for Ultra-high Strength Steel” was awarded the second prize for Aeronautical Scientific and Technological Progress by China Aeronautical Ministry(1993)(first prizewinner)
- 2) The achievement “Low Temperature Fatigue Behavior and Prediction Method of Metallic Materials” was awarded the third prize for Aeronautical Scientific and Technological Progress by China Aeronautical Ministry(1994)(third prizewinner)
- 3) The achievement “A new microcomputer aided system for measuring low temperature fatigue crack initiation life and propagation rate” was awarded the third prize for Scientific and Technological Progress by the Educational Committee of Shaanxi Province of China (1992)( first prizewinner)
- 4) The achievement “Corrosion fatigue crack growth behavior of ultra-high strength steel” was awarded the third prize for Scientific and Technological Progress by the Educational Committee of Shaanxi Province of China (1993)( first prizewinner)
- 5) The achievement “A set of microcomputer aided system for measuring corrosion fatigue crack propagation rate” was awarded the third for Scientific and Technological Progress by the Educational Committee of Shaanxi Province of China (1991)( first prizewinner)

#### Teaching Work:

##### 1. Classroom Teaching:

Six courses have been respectively lectured to postgraduate students, undergraduate students, or training class trainees.

- 1) “Corrosion principle and corrosion fracture” as a required course for postgraduate students.
- 2) “Elastic and Plastic Mechanics”: as a required course for postgraduate students.
- 3) “Fracture Mechanics” as a elective course for postgraduate students
- 4) : Corrosion and protection of metals” as a required course for undergraduate students.
- 5) “Corrosion fracture and failure analysis” as a required course for training class trainees.
- 6) “Principle and method of microcomputer aided measurement of crack propagation” as a required course for training class trainees.

##### 2. Instruction of Dissertation

I have directly instructed three Master’s degree students as the tutor and cooperatively instructed one doctoral student as the associate tutor, all of these students have obtained their Master’ degree or Doctor’s degree.

#### Visiting Experience:

To date, I have worked in England for one half year and totally visited USA five times.

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| In England         | During April 4 to October 15, 1997(one half year), worked as a research scientist in National Physics Laboratory (NPL) in England.   |
| First time to USA: | In December of 1994, I visited several research institutions in USA, such as Southwestern Research Institute in San Antonio and Amoco Research Center in Chicago, and given an academic presentation in Amoco Research Center. |
| Second time to USA | In November of 1995, I visited other several research institution in USA, such as Cortest Columbus Technologies in Columbus, Cortest Incorporated in Cleveland and EG&G Instruments in Princeton                               |
| Third time to USA  | In March of 1998, attended the NACE98 annual conference in San Diego.  |

- Fourth time to USA In September of 1998, attended the API fall refining meeting in Orlando and visited Multiphase fluid erosion and corrosion research center of Ohio University in Athens and InterCorr International in Houston.
- Fifth time to USA In April of 1999, attended the NACE99 annual conference and visited several research institution such as Pipeline integrity International in Houston, Southwestern Research Institute in San Antonio and Cortest Incorporated in Cleveland.