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主要教育工作经历

1991—1995 北京航空航天大学 本科，应用数学

1995—1998 北京航空航天大学 硕士，应用数学，导师：管克英

1998—2001 北京航空航天大学 博士，一般力学，导师：管克英

2001—2003 清华大学数学科学系 博士后，导师：章梅荣

2003—2006 清华大学周培源应用数学研究中心 助理研究员

2006—2019 清华大学周培源应用数学研究中心 副研究员

2020— 天津工业大学数学科学学院 教授

2004.8—2005.7 美国加州大学 Irvine 分校 访问助理教授

2005.7—2005.12 McGill University 访问学者

科研项目

2019.1—2023.12 自然科学基金重点项目，项目参加人（排名第二），题目“癌症演变的高维组学数据分析与多尺度随机动力学建模”，金额 250 万

2018.1—2019.12 自然科学基金重大研究计划重点集成项目，项目主持人，题目“干细胞增殖的计算建模及其在癌症演变动力学的应用”，金额 160 万

2015.1—2017.12 自然科学基金重大研究项目培育项目，项目主持人，题目“成体干细胞再生与分化调控的逆向建模”，金额 70 万

2013.1—2016.12 自然科学基金面上项目，项目主持人，题目“造血系统动力学分析与控制策略研究”，金额 78 万

2007.1—2009.12 自然科学基金青年项目，项目主持人，题目“影响果蝇成虫盘发育的基因 网络的数学模型”，金额 17 万

学术兼职

运筹学会计算系统生物学分会常务理事

工业与应用数学学会数学生命科学专业委员会副主任

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科研情况

主要从事计算系统生物学领域的研究，对从分子到多细胞体系不同尺度的生命过程建立可计算模型，以实验事实为基础探索复杂现象背后的普适规律和定量模型，通过数学和计算手段研究生命科学问题。主要研究内容包括：蛋白质折叠的物理机制、发育生物学中模态形成和鲁棒性的机制、造血系统动力学与动态血液病、基因调控网络的动力学、计算癌生物学、生物信息学、健康大数据分析。在 PNAS, Phy Rev Lett, Cancer Research, J Theor Biol, SIAM J Math Anal, J Diff Equ 等国际期刊发表论文 70 余篇，共被引用 600 多次，出版了一本系统生物学著作，主持国家自然科学基金项目四项，并被邀请在 **2019** 年国际生物数学大会**(SMB2019)**做大会报告。主要学术成就包括建立原创的异质性干细胞增殖过程的多尺度计算模型框架，提出基于个体模型的癌症演变过程可计算模型和基于 GPU 的并行计算开发平台，对造血系统动力学和肿瘤演变过程的多尺度计算建模研究有深刻的而理解。

代表性论文

1. **Jinzhi Lei**, 2020. A general mathematical framework for understanding the behavior of heterogeneous stem cell regeneration. **J Theor Biol**, 492, 110196.
2. **Jinzhi Lei**, Simon A. Levin\*, Qing Nie, Mathematical model of adult stem cell regeneration with cross-talk between genetic and epigenetic regulation, **PNAS**, 2014, E880-E887.
3. You Song, Siyu Yang, **Jinzhi Lei\***, 2019. ParaCells: A GPU architecture for cell-centered models in computational biology. **IEEE/ACM Transactions in Computational Biology and Bioinformatics**, 16(3), 994-1006.
4. Zhen Wang, Xiong Li, **Jinzhi Lei\***, Moment boundedness of linear stochastic delay differential equations with distributed delay. **Stochastic Processes and their Applications**, 124(2014), 586-612.
5. **Jinzhi Lei**, On a classification of polynomial differential operators with respect to the type of first integrals. **J Differential Equations**, 260(2016), 1993-2025.
6. **Jinzhi Lei**, Wing-Cheong Lo, Qing Nie\*, Mathematical models of morphogen dynamics and growth control, **Annals of Mathematical Sciences and Applications**, 1(2016), 427-471. (受邀综述)
7. Yucheng Guo, Qing Nie, Adam L. MacLean, Yanda Li, **Jinzhi Lei\***, Shao Li\*, Multiscale modeling of inflammation-induced tumorigenesis reveals competing oncogenic and oncoprotective roles for inflammation. **Cancer Research**, 77(2017), 6429-6441.
8. Vincent Lemaire, Chiu Fan Lee, **Jinzhi Lei**, Raphael Metivier, Leon Glass\*, Sequential recruitment and combinatorial assembling of multiprotein complexes in transcriptional activation, **PRL**, 96, 198102(2006).

专著**/**译著

1. 雷锦誌，系统生物学—建模、分析、模拟，上海科学技术出版社，2010.
2. 刘俊丽，武林晓，雷锦誌，英语科技写作，机械工业出版社，2011.

其他发表论文列表

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2. Lei, J., 2020. Viewpoints on modelling: comments on “Achilles and the torroies: some cavets to mathematical modelling in biology”. Math Appl Sci Eng, 1(1), 1-7.
3. Liu, J. X., Song, Y., **Lei, J.\***, 2020. Single-cell entropy to quantify the cellular order parameter from single-cell RNA-seq data. Biophys Rev Lett, doi:10.1142/S1793048020500010.
4. **Lei, J.**, 2020, Evolutionary dynamics of cancer: From epigenetic regulation to cell population dynamics-mathematical framework, application, and open problems. Sci China Math, 63(3), 411-424.
5. Yang, H. L., **Lei, J.\***, 2019, A mathematical model of chromosome recombination-induced drug resistance in cancer therapy. Math Biosci Eng., 16(6), 7089-7111.
6. Huang, R. S., **Lei, J.\***, 2019. Cell-type switches induced by stochastic histone modification inheritance. Discrete and Continuous Dynamical Systems-B,22(11), 1-19.
7. Ye, Y. S., Yang, Z. Q., **Lei, J.\***, 2019. Stochastic telomere shortening and the route to limitless replicative potential. J. Comput. BIol., 26, doi:10.1089/cmb.2018.0234.
8. Zhuge, C., C Mackey, M., **Lei, J.**∗, 2019. Origins of oscillation patterns
in cyclical thrombocytopenia. J. Theor. Biol, 462, 432-445.
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10. Jiao, X., **Lei, J.**∗, 2018. Dynamics of gene expression based on epigenetic modifications. Communications in Information and Systems, 18, 125148.
11. Hao, L., Yang, Z., **Lei, J.**∗, 2018. Underlying mechanisms of cooperativity, input specificity, and associativity of long-term potentiation through a positive feedback of local protein synthesis. Frontiers in Computational Neuroscience, 12, 25.
12. Song, Y., Situ, F., Zhu, H., **Lei, J.**∗, 2018. To be the Prince to wake up Sleeping Beauty: the rediscovery of the delayed recognition studies. Scientometrics, 117, 9-24.
13. Huang, R., **Lei, J.**∗, 2018. Dynamics of gene expression with positive feedback to histone modifications at bivalent domains. Int. J. Mod. Phys. B, 32, 1850075.
14. Hao, L., Yang, Z., Gong, P., **Lei, J.**∗, 2018. Maintenance of postsynaptic neuronal excitability by a positive feedback loop of postsynaptic BDNF expression. Congitive Neurodynamics, 12(4), 403-416, doi:10.1007/s11571- 018-9479-z.
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17. Xia, W., **Lei, J.**∗, 2018. Formulation of the protein synthesis rate with sequence information. Math. Biosci. Eng., 15(2), 507-522.
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46. Gu, C., Zhang, J., Chen, Y., **Lei, J.**∗, 2011. A trigger model of TNF sig-
naling induced apoptosis. BMS Systems Biology, 5 (Suppl 1):S13, doi:10.1186/1752- 0509-5-S1-S13.
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