Tianjiao Dai

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Summary

1 Solid theoretical knowledge and engineering experience (10 years) of **rigid pipeline, flexible pipe, umbilical and power cable**; Extensive experience in stress analysis, dynamic response analysis and fatigue analysis.

2 Experienced in programming in Fortran and **developing finite element software BFLEX2010**. Developed friction models have been well recognized in industry, especially applied in the users (such as Prysmian, 4subsea, Kongsberg, etc.) of BFLEX2010.

3 Project and research team management; team player.

Education

2014.08-2018.11 **Norwegian University of Science and Technology (NTNU), Norway**

PhD supervisors: Prof. Svein Sævik, Dr. Naiquan Ye (SINTEF OCEAN, Research manager)

PhD thesis: On shear interactions and friction stresses in flexible pipes and umbilicals

2011.08-2013.06 **NTNU**

Master of Science in Marine structure. Master supervisor: Prof. Svein Sævik

Master thesis: Anchor hooking of pipeline

2007.08-2011.07 **Harbin Engineering University, China**

Bachelor of Science in Naval Architecture and Ocean Engineering

Working experience

IKM Ocean Design AS — Subsea Engineer

2013.08-2014.07

Trondheim, Norway

- Rigid pipeline design and verification in concept, FEED projects.
- Perform special design of snaking installation, walking, buckling, trawling interaction etc.

NTNU — PhD, research work

2014.08-2018.11

Trondheim, Norway

- Extensive practical experience in performing full scale tests of dynamic umbilical for measuring the mechanical properties.
- Develop creative friction models for nonbonded flexible pipe and dynamic umbilical and solve the long-term difficulty of how to determine a correct fatigue life, which paves a solid theoretical foundation for the flexible pipe and umbilical's application in the deep and ultra-deep waters.
- Practical experience in developing friction modules for the finite element software BFLEX2010 and these modules have been directly applied and well recognized in industry since 2017.
- Professional in structural analysis, dynamic response analysis and fatigue analysis of flexible pipe, umbilical and power cable.

Huazhong University of Science and Technology (HUST)

2019.01-present

Wuhan, China

Assistant professor

- Support and supervise 11 undergraduates and 5 master students since 2019 for their theses in the field of SURF design and installation. Control the quality and efficiency of their deliverables.
- Teach three BEng courses including <Finite element method>, <marine structure> and <Professional English applied in naval architecture and ocean engineering>.
- As a project manager, be responsible to project tender, communicate with clients and give guidance to my research team, etc. The accumulated project funding won from research council, industry and government since 2019 is **1080,000RMB (about 1620,000NOK**).

Project examples

IKM Ocean Design AS

Trondheim, Norway

2013.08-2014.07

Project name: Peregrino Phase II FEED SURF

- Contribute in pipeline snaking route design and solved the post-buckling deformation controlled in an acceptable range.

Project name: Johan Sverdrup Infield Pipeline Concept Study

- Contribute in investigating the ocean current effect on the lateral displacement and lateral buckling of the steel pipe on bottom.

Project name: GRD Project FEED Study & Kvitebjørn Flow Study

- Contribute in establishing the complex full-scale trawling model
- Comprehensively investigate the impact and pull-over phase effect on the global response of pipeline

NTNU

Trondheim, Norway

2014.08-2018.11

Project name: Dynamic umbilical JIP

- Practical skills of performing full scale test of umbilical under combined tension and bending loads.
- Contribute in programming to deal with test measurement for understanding the dynamic stress behavior of helical components and speed up the workflow.
- Develop new numerical modeling methodology of umbilical's cross section and improve the dynamic stress accuracy.
- Present latest numerical analysis results and improvements in developing FE software (Bflex and Uflex) in important JIP meetings and software user meetings.

HUST

Wuhan, China

- 2019.01-present

Project name: Fatigue mechanism study of dynamic umbilical applied in oil & gas industry (Research council sponsored)

- Responsible to develop a new method to consider fretting fatigue in the conventional fatigue life.

Project name: Dynamic response analysis of subsea power cable applied in oil & gas and wind turbine industry (research council sponsored)

- Solve the power cable response under current load in a stochastic way.
- Propose a new global configuration design for reducing the power cable response in shallow water.

Project name: Fatigue life prediction of nonbonded flexible pipe applied in Xijiang (CNOOC, China) oil and gas field (industry sponsored)

- Perform global response analysis of flexible pipe under dynamic motion of FPSO and combined wave and current load conditions.
- Develop a new method for the pipe fatigue life assessment when the annulus layer is wet or fully fulfilled with fluid, resulting in significant numerical analysis computation time saving.

Project name: Fatigue damage prediction of nonbonded flexible pipe applied in Sabah (industry sponsored),

- Communicate with flexible pipe supplier and determine the project scope
- Support clients with more flexible numerical methodologies, resulting in significant cost saving and boosting efficiency for the experimental verification of fatigue damage prediction

Skills

Language	English, Chinese
Programming	Python, Matlab, Fortran
Professional software	**SIMLA,** ANSYS, ABAQUS, **BFLEX2010, UFLEX2D**, OrcaFlex, Helica, Riflex.

Journal and conference papers

1 Dai Tianjiao, Zhang Jiaxuan, Ma Yucong*, Xing Yihan. "Energy efficient design of an SST-flowline system using a coupled dynamic analysis approach". **Ocean Engineering** 2024. Accepted.

2 Li Pengjie, Dai Tianjiao*, Jin Xing, Dong Leilei, Liu Shuaiqi, Yang Shuo, Xiang Xianbo, Kang Hooi-Siang. "An efficient fatigue analysis for the nonbonded flexible riser". **Ship and offshore structures**.1-16, 2021.10, Impact factor, 1.977.

3 Dai, Tianjiao; Sævik, Svein; Ye, Naiquan. (2020) "Experimental and numerical study on dynamic stress and curvature in the steel tube umbilical". **Marine structures.**

4 Dai, Tianjiao; Sævik, Svein; Ye, Naiquan. (2018) "An anisotropic friction model in non-bonded flexible risers". **Marine Structures.** vol. 59. Impact Factor 2.584

5 Dai, Tianjiao; Sævik, Svein; Ye, Naiquan. (2017). "Friction models for evaluating dynamic stresses in non-bonded flexible risers". **Marine Structures**. vol. 55. Impact Factor 2.584

6 Dai, Tianjiao; Ye, Naiquan.; Sævik, Svein. (2017) "The effect of stick stiffness in friction models on the bending behavior in flexible risers". **OMAE** - International Conference on Ocean, Offshore & Arctic Engineering.

7 Dai, Tianjiao; Sævik, Svein; Ye, Naiquan. (2016) "Comparison study of umbilicals' curvature based on full scale tests and numerical models". **ISOPE** - International Offshore and Polar Engineering Conference.

8 Wang, Howard; Ye, Naiquan; Dai, Tianjiao; Sævik, Svein. (2015) "Effect of Surface Contact Stiffness on Stress Analysis of Umbilicals". **ISOPE** - International Offshore and Polar Engineering Conference.