

INFORMATION ON DOCTORAL THESIS

1. Full name: Nguyen Dinh Du
2. Sex: Male
3. Date of birth: 22 February 1985
4. Place of birth: Binh Dinh province
5. Admission decision number: 778/QĐ-CTSV Dated: 21 August 2017 by the Rector of UET.
6. Changes in academic process: No
7. Official thesis title: Research and application of CFEM method in solid mechanics
8. Major: Engineering mechanics
9. Code: 9520101.01
10. Supervisors: Professor Dr.Sci. Nguyen Dinh Duc

Associate Professor Dr. Bui Quoc Tinh

11. Summary of the new findings of the thesis:

- Construction of general CFEM shape functions for a wide range of elements for two- and three-dimensional problems of solid mechanics.
- Successful application of CFEM in problems of solid mechanics and fracture mechanics, for both homogeneous and functionally graded materials.
- Successful application of CFEM in analysis of geometrically nonlinear two- and three-dimensional problems for nearly incompressible and homogeneous materials.
- Development of new numerical integration schemes, namely the 3D-EM and the EF schemes, which requires less quadrature points than the traditional Gaussian method and thus computational time is saved, while the accuracy is maintained.

12. Practical applicability, if any: This dissertation contributes to the computational mechanics in further development of a numerical method namely CFEM, as well as a new numerical integration scheme alternative to the Gaussian quadrature. The techniques proposed by this dissertation can be implemented in commercial softwares.

13. Further research directions, if any:

- Extension on analysis in-elastic behavior of material, including elasto-plasticity, and/or damage initiation and evolution.
- Incorporation of assumed strain into CFEM formulation, in order to improve accuracy in analysis of hyper-elastic solids.
- Extension of CFEM on modeling the behavior of FGM solids, either intact or cracked bodies, under thermo-mechanical load is also an interesting topic, taking into account the increasing popularity of FGM in many engineering fields, such as aviation, transport and construction.

14. Thesis-related publications:

1. Du Dinh Nguyen, Duc Dinh Nguyen, Tinh Quoc Bui (2017). Một phương pháp tích phân mới cho phần tử tứ giác nội suy kép (CQ4) cải thiện ma trận độ cứng (in Vietnamese). National Conference on Mechanics X, 8-9/12/2017.

2. Du Dinh Nguyen, Duc Dinh Nguyen, Tinh Quoc Bui (2018). Áp dụng PTHH nội suy kép phân tích vật liệu chức năng đàn hồi tuyến tính 2D (in Vietnamese). National Conference on Solid Mechanics XIV, Tran Dai Nghia University, Ho Chi Minh city, 19-20/07/2018.

3. Du Dinh Nguyen, Duc Dinh Nguyen, Tinh Quoc Bui (2019). Phương pháp tích phân mới áp dụng cho phần tử lục diện nội suy kép (CHH8) cải thiện thời gian tính toán (in Vietnamese). National Conference on Engineering Mechanics, celebrating the 40th anniversary of Institute of Mechanics – Viet Nam Academy of Science and Technology, Ha Noi, 09/04/2019.

4. Du Dinh Nguyen, Duc Dinh Nguyen, Tinh Quoc Bui (2019). Phân Tích Động Bài Toán Nứt Phẳng Của Vật Liệu FGM Bằng Phần Tử Tứ Giác Mở Rộng Nội Suy Kép (XCQ4) (in Vietnamese). National Conference on Dynamics and Control I, University of Science and Technology – Da Nang University.

5. Du Dinh Nguyen, Minh Ngoc Nguyen, Nguyen Dinh Duc, Jaroon Rungamornrat, Tinh Quoc Bui (2021). Enhanced nodal gradient finite elements with new numerical integration schemes for 2D and 3D geometrically nonlinear analysis. Applied Mathematical Modelling, 93, pp. 326-359.

6. Du Dinh Nguyen, Dinh Duc Nguyen, Tinh Quoc Bui (2021). Analysis of linear elastic fracture mechanics for cracked functionally graded composite plate by enhanced

local enriched consecutive-interpolation elements. VNU Journal of Science: Mathematics – Physics, Vol. 37, No. 1, pp. 1-11.

7. Du Dinh Nguyen, Minh Ngoc Nguyen, Nguyen Dinh Duc, Tinh Quoc Bui (2022). Modeling the transient dynamic fracture and quasi-static crack growth in cracked functionally graded composites by the extended four-node gradient finite elements. Composite Structures, 284, 115056.

Date: December 2022
Supervisor

Date: December 2022
PhD Student

Professor Dr.Sci. Nguyen Dinh Duc

Nguyen Dinh Du