

KAKATIYA GOVERNMENT COLLEGE
HANUMAKONDA

Name : Dr. D. Venkanna
 Designation : Assistant Professor
 Year of Award of Ph.D. : 2022
 Name of the University : Kakatiya University, Warangal
 Year of entering into Govt. Service : ~~2013~~ 1998

S. No.	Details of copies of Certificates	Remarks
1	Copy of Ph.D Certificate	Enclosed
2	Press note	Enclosed
3	Research work dates of seminars and Pre-Ph.D Date of joining in this college	Enclosed 20-06-2018
4	Details of Ph.D Admission-part time or full time	Enclosed
5	Copies of RDC Approval letters of Ph.D	NA
6	Name of guide/supervisors with mobile number, email id	Enclosed
7	Copies of guide allotment letter	Enclosed
8	No. of increments sanctioned for Ph.D.	03
9	Published Research article-copies.	Enclosed
10	Original Ph.D Thesis.- Book.	Available in office

Part-time



PRINCIPAL
KAKATIYA GOVT.COLLEGE
Hanamkonda.



Signature

Name & Designation
Dr. D. Venkanna
Asst. Prof. of Mathematics

Kakatiya University

4249

No. 0983



PROVISIONAL CERTIFICATE

Ph.D.

This is to certify that Deshaboina Venkanna
Son/Daughter of Somaiah has been declared
qualified for the award of the Ph.D. Degree in
Mathematics of this University in October, 2022.

Topic of Thesis:

"STUDY OF WAVE PROPAGATION IN DOUBLE POROSITY SOLIDS"

Warangal T.S. - 506 009

Date: 25-10-2022

V. M. Reddy
for Registrar

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**EXAMINATION BRANCH
KAKATIYA UNIVERSITY
WARANGAL - 506 009 (TS) INDIA**

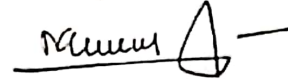
No. 946 /Ph.D./E1/KU/2022

Date: 15-10-2022

PRESS NOTE

Mr/Ms. Deshaboina Venkanna, Research Scholar in Mathematics, Kakatiya University, Warangal, who has presented the thesis entitled "STUDY OF WAVE PROPAGATION IN DOUBLE POROSITY SOLIDS" has been declared qualified for the Degree of Doctor of Philosophy (Ph.D.) in Mathematics of Kakatiya University.

"By Order"



CONTROLLER OF EXAMINATIONS

Copy forwarded for information to:

1. The Registrar, Kakatiya University, Warangal.
2. The Secretary, University Grants Commission, New Delhi-110 002.
3. The Editor, University News, A.I.U., 16 Kotla Marg, New Delhi-110 002.
4. The Dean, Faculty of Sciences, KU, Warangal.
5. The Coordinating Officer, U.G.C. Unit, Kakatiya University, Warangal.
6. The Principal, University College, Kakatiya University, Wgl.
7. The Chairperson, Board of Studies in Mathematics, K.U., Wgl.
8. The Head, Department of Mathematics, KU, Wgl.
9. The EXAMINER.
10. Prof. P. Malla Reddy (Supervisor), Department of Mathematics, Kakatiya University, Warangal.
11. The Nodal Officer, Kakatiya University, Warangal.
12. The Member-in-Charge, University Library, Kakatiya University, Warangal.
13. The Deputy Registrar (Admn.), Kakatiya University, Warangal.
14. The Public Relations Officer, Kakatiya University, Warangal.
15. The Secretary to Vice-Chancellor, Kakatiya University, Warangal.
16. The Documentation Section (E5), Examination Branch, KU, Warangal.
- ✓ 17. The Person concerned (Deshaboina Venkanna S/D/o. Somaiah)

(4249)

To
The principal,
University College,
Kakatiya University,
WARANAGAL-506009 (TS).

Date: 12.02.2018.

// (Through Proper Channel) \\

Sub: - Admission in to Ph.D programme in Mathematics (Part- Time) in the Department of Mathematics- Submission of Joining Report- Regarding.

Ref: - KU order No. 15/DFS/KUW/2018.

Respected Sir,

With reference to the subject cited above, I am herewith submitting my joining as a research scholar on Part- Time basis to work my Ph.D on the topic entitled "INVESTIGATION OF VARIOUS VARIANTS IN FLUID FLOW THROUGH POROUS MEDIUM "under the esteemed supervision of Prof. P.MALLA REDDY, Department of Mathematics, Kakatiya University, Warangal.

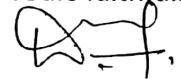
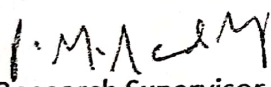
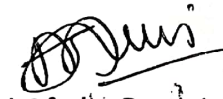

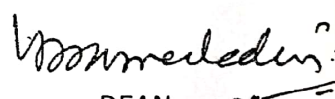
Therefore, I request you to consider the above.

Thanking you.



Principal
University College
Kakatiya University
Warangal-506 009 T.S.

Yours faithfully,


D.VENKANNA
Research Supervisor
DEPARTMENT OF MATHEMATICS
Kakatiya University
Warangal 506 009 (A.P.)
Head Of the Department
Department of Mathematics
KAKATIYA UNIVERSITY
WARANGAL 506 009
Chairman, BOS
Chairperson, BOS
Department of Mathematics
University College
Kakatiya University, Warangal.
DEAN
DEAN
Faculty of Science
Kakatiya University
Warangal-506 009 (T.S.)

000



KAKATIYA UNIVERSITY

B 5095717

WARANGAL - 506 009 (T.S.)

MEMORANDUM OF MARKS

Examination PRE-PH. D. (MATHEMATICS) AUG. 2019

Date: 04-11-2019

Candidate's Name DESHABODINA VENKANNA

Father's Name SOMAIAH

Roll No. 170002607

SUBJECT	MAXIMUM MARKS	PASS MARKS	MARKS SECURED	SUBJECT RESULT
RESEARCH METHODOLOGY	100	050	060	PASS
CONTINUUM MECHANICS & PARTIAL DIFFR. EQU.	100	050	072	PASS
TOTAL MARKS : ONE HUNDRED AND THIRTY TWO				132
RESULT : PASSED				

NOTE Application with prescribed fee for recounting/reevaluation will be accepted only upto ten days from the date of Memorandum of Marks.

Abhishek
SECTION IN-CHARGE

Srinivas
CONTROLLER OF EXAMINATIONS

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DEPARTMENT OF MATHEMATICS

University College, Kakatiya University, Warangal -506 009, Telangana
09849133398, 0870-2461425 | Office Email: Dr-pvra@kuv.edu.in

CERTIFICATE

This is to certify that Sri. D. Venkanna working for his Ph.D. (Part-Time) on the topic "Investigation of Various Variants in Fluid Flow through Porous Medium" under the supervision of Prof. P. Malla Reddy has presented his Seminar I, as per UGC regulation-2009 of Doctor of Philosophy conducted by the Department of Mathematics, University College, Kakatiya University, Warangal on 19-06-2021 at 11.00 a.m.

P. Malla Reddy

Supervisor
Department of Mathematics,
Kakatiya University, Warangal

P. Malla Reddy

HEAD
Department of Mathematics,
Kakatiya University, Warangal

P. Malla Reddy

Chairperson, BOS
Department of Mathematics,
Kakatiya University, Warangal

P. Malla Reddy

DEAN
Faculty of Science
Kakatiya University, Warangal

Department of Mathematics
Kakatiya University

Department of Mathematics
Kakatiya University, Warangal



DEPARTMENT OF MATHEMATICS

University College, Kakatiya University, Warangal -506 009, Telangana
☎9849133398, ☎0870-2461425 |Office| Email: hr-raj@kakatiyauniv.ac.in

CERTIFICATE

This is to certify that Sri. D. Venkanna working for his Ph.D. (Part-Time) on the topic "Study of Wave Propagation in Double Porosity Solids" under the supervision of Prof. P. Malla Reddy has presented his Seminar II, as per UGC regulation-2009 of Doctor of Philosophy conducted by the Department of Mathematics, University College, Kakatiya University, Warangal on 24-02-2022 at 2.00 p.m.

P.M. Reddy
Supervisor

Department of Mathematics,
Kakatiya University, Warangal

[Signature]
HEAD

Department of Mathematics,
Kakatiya University, Warangal

[Signature]
Chairperson, BOS

Department of Mathematics,
Kakatiya University, Warangal

[Signature]
DEAN

Faculty of Science
Kakatiya University, Warangal



OFFICE OF THE DEAN

Faculty of Science

Kakatiya University, Warangal – 506 009 (T.S.), India
(Accredited with "A" Grade by the NAAC)

Prof. K.David
Dean
Professor of Geology

Phone: (O) 0870 – 2461434

No.20 /DFS/KUW/2021

Date: 16-03-2021

ORDER

Sub: Faculty of Sciences - Ph. D. Programme in Department of Mathematics - for the
Academic year 2015-2016 - Regarding
Ref: 15/DFS/KUW/2018 dated 09/02/2018

On the recommendation of the Admission Committee and with the approval of the Vice-Chancellor, Kakatiya University, Warangal, the following candidates has been provisionally selected for admission to the Ph. D. Programme for the year 2015-2016 in the Department of Mathematics.

Name of Candidates	Social Statuses	Title of the Ph.D Research topic	Name of the Research Supervisor	Research
Sambasiva Rao S	OC	A study on conformal mappings and bilinear transformations	Dr.R.Bharavi sharma	Part-Time
Kadire Sunitha	OC	A study on reliability models	Dr.T.Sumathi Uma Maheswari	Part-Time
Aalla Ravi Kumar	BC-D	Some problems of wave propagation in micro-elastic solids	Dr. K.Somaiah	Part-Time
Kumar Ragula	BC-B	Numerical methods for a class of singularly perturbed differential – difference equations	Dr.B.S.L.Soujanya G.	Part-Time
Dolledla Harika	OC	Investigation of steady state probability vector of positive definite regularized linear systems of stochastic matrices	Dr.L.P.Raj Kumar	Part-Time
M.Venu Gopal	BC-D	Wave propagation in poroelastic solids	Prof.P.Malla Reddy	Part-Time
D.Venkanna	BC-D	Investigation of various variants in fluid flow through porous medium	Prof.P.Malla Reddy	Part-Time
Laxman Kumar. T	OC	Internet router modeling multi server transient queuing models	Prof.P.Malla Reddy	Part-Time
T.Thirupathi	BC-D	Performance analysis of multi server queuing systems with disaster	Dr.L.P.Raj Kumar	Part-Time
Swarnakar Dornala	OC	Numerical study of multiparameter singular perturbation problems	Dr.B.S.L.Soujanya. G	Part-Time
A.Satyanarayana	BC-B	Study on estimating the reliability for stress-strength models	Dr.M.Tirumala Devi	Part-Time

	Yakoobpasha.MD	BC-B	Reliability to develop the stress dependent reliability models	Dr. I. Sumathi Uma Maheswari	Part-Time
	Sandhya Rani Kanukuntla	BC-B	Estimation of reliability on stochastic stress-strength models	Dr. T. Sumathi Uma Maheswari	Part-Time
14	Gonela Anitha	BC-B	Propagation of waves in rotating micro elastic solids	Dr. K. Somaiah	Part-Time
15	Ala Sindhuja	BC-D	Study on anisotropic pore elastic solids using wave based methods	Prof. P. Malla Reddy	Part-Time
16	Kondam Ravinder Reddy	OC	Mathematical modeling of retrieval queueing system under fuzzy environment	Dr. L. P. Raj Kumar	Part-Time
17	Yakaiah.K	BC-A	A Study on the coefficient inequalities for some subclasses of analytic functions	Dr. R. Bharavi sharma	Part-Time
18	Chepuri Rajitha	SC	Performance study on the dependent queueing system with server on vacation	Dr. L. P. Raj Kumar	Part-Time
19	Venkateswara Rao Burugu	SC	Studies of wave propagation problems in elastic solids	Dr. K. Somaiah	Part-Time
20	Narsimhara Rao Kandula	SC	Wave propagation in different elastic solids	Dr. K. Somaiah	Part-Time
21	Gouraveni Saritha	ST	Reliability estimation for stress-strength models	Dr. M. Tirumala Devi	Full-Time
22	Sameena Afreen	BC-E	Study on survival Analysis	Dr. M. Tirumala Devi	Part-Time
23	Poonem Latha madhuri	ST	Study of wave propagation on anisotropic pore elastic solids using biot extension theory	Prof. P. Malla Reddy	Part-Time
24	M. Jyothirmai	BC-C	Performance study of priority based internet router with self similar input traffic transient queueing system markovian modelled input process	Prof. P. Malla Reddy	Part-Time

DEAN ²⁴ 03/2021

Copy to:

1. The Principal, University College, KU.
2. The Head, Department of Mathematics, KU
3. The Chairperson, Board of Studies in Mathematics, KU
4. The Supervisors concerned
5. The Controller of Examinations, KU
6. The Member In-charge, University Library, KU
7. The Deputy Registrar, Academic Branch, KU
8. The Secretary to Vice-Chancellor, KU
9. The SF

Supervisor Details

Name: Prof. P. Malla Reddy

Department: Mathematics

Mobile: 9866578585

E-Mail: mperati@yahoo.com





**OFFICE OF THE DEAN
FACULTY OF SCIENCE**

**Kakatiya University, Warangal – 506 009 (T.S.), India
(Accredited with “A” Grade by the NAAC)**

**Prof. Y. Prameela Devi
Professor of Zoology & Dean**

Phone: (O) 0870-2461434

No. 15/DFS/KUW/2018

Date: 09/02/2018

ORDERS

**Sub: Faculty of Science - Ph. D. Admissions for the Year 2015-16 and 2016-17 -
Department of Mathematics - Orders – Issued**

On the recommendation of the Admission Committee and with the approval of the Vice-Chancellor, Kakatiya University, Warangal the following candidates have been provisionally selected for admissions into the Ph.D. Programme for the year 2015-16 and 2016-17 in the Department of Mathematics.

SI No	Name of the Candidate	Social Status	Name of the Research Supervisor
01.	Sambasiva Rao. S.	OC	Dr. R. Bharavi Sharma
02.	Kadire Sunitha	OC	Dr. T. Sumathi Uma Maheswari
03.	Aalla Ravi Kumar	BC-D	Dr. K. Somaiah
04.	Kumar Ragula	BC-B	Dr. B.S.L. Soujanya. G
05.	Dollebla Harika	OC	Dr. L.P. Raj Kumar
06.	M. Venu Gopal	BC-D	Prof. P. Malla Reddy
07.	D. Venkanna	BC-D	Prof. P. Malla Reddy
08.	Laxman Kumar. T	OC	Prof. P. Malla Reddy
09.	T. Thirupathi	BC-D	Dr. L.P. Raj Kumar
10.	Swarnakar Dornala	OC	Dr. B.S.L. Soujanya. G
11.	Satyanarayana. A	BC-B	Dr. M. Thirumala Devi
12.	Balla Prashanthi	BC-B	Dr. M. Thirumala Devi
13.	Yakoobpasha. MD.	BC-B	Dr. T. Sumathi Uma Maheshwari
14.	Sandhya Rani Kanukuntla	BC-B	Dr. T. Sumathi Uma Maheshwari
15.	Gonela Anitha	BC-D	Dr. K. Somaiah
16.	Ala Sindhuja	BC-D	Prof. P. Malla Reddy
17.	Kondam Ravinder Reddy	OC	Dr. L.P. Raj Kumar
18.	Yakaiah. K.	BC-A	Dr. R. Bharavi Sharma

19.	Chepuri Rajitha	SC	Dr. L.P. Raj Kumar
20.	Venkateswara Rao Burugu	SC	Dr. K. Somaiah
21.	Narasimhara Rao Kandula	SC	Dr. K. Somaiah
22.	Gouraveni Saritha	ST	Dr. M. Thirumala Devi
23.	Sameena Afreen	BC-E	Dr. M. Thirumala Devi
24.	Poonem Latha Madhuri	ST	Prof. P. Malla Reddy
25.	M. Jyothirmai	BC-C	Prof. P. Malla Reddy

The above candidates are required to submit the following certificates in original along with Application Form for Admission into Ph.D. Programme to the Principal, University College, KU for verification and finalization of admission into the Ph. D. Programme. The candidate should also submit the synopsis of the research proposal in consultation with the Research Supervisor.

1. Post-Graduate / M. Phil Degree Certificate
2. NET/SLET certificates,
3. Entrance Test Result Card
4. Transfer Certificate
5. Caste Certificate
6. No Objection Certificate from the Employer (applicable to employees)
7. Migration Certificate (in case of candidates who obtained PG/M. Phil degree from an institution other than Kakatiya University)
8. Applicable fees (to be specified by the office of the Principal, University College, KU and to be remitted at SBI, Kakatiya University Branch, Warangal).

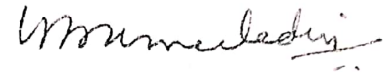
After getting the above certificates verified the candidates have to submit their Joining Report duly endorsed by the Supervisor, Head of the Department, Chairperson, Board of Studies and Dean, Faculty of Sciences to the Principal, University College, KU under intimation to the undersigned on or before 08-03-2018 failing which their admission will be cancelled.

The above admission is subject to the following conditions:

1. The admitted candidate has to complete the Ph. D. programme within a minimum period of 2/3 years and a maximum of 4/5 years from the date of registration for full time/part time scholars respectively.
2. He/She has to renew his/her admission through proper channel by paying the applicable fees every year as per the norms of the Office of the Principal, University College, KU and file a copy of the receipt/challan with the Office of the Dean, Faculty of Sciences.
3. He/She should give a minimum of two (2) seminars during the programme, including one before the submission of thesis.
4. He/She should publish at least one paper in the research area concerned in a reputed/recognized journal before submission of thesis.

5. He/She should submit half-yearly progress reports on the work through the Supervisor, Chairperson, Board of Studies and Head of the Department to the undersigned.
6. The candidates should undergo course work and pass Pre-Ph. D. examination within two successive attempts from the date of registration.
7. The in-service candidates working outside Warangal, and registered as Part-time scholars, are required to put in at least six months of attendance in the Department.
8. In all other matters they shall be governed by the existing rules and regulations of the Ph. D. Programme. effective for the Ph. D. admissions in vogue

Any deviation in observing the above rules by the candidates will entail cancellation of their registration.



DEAN

Copy to:

1. The Principal, University College, KU
2. The Head, Department of Mathematics, KU
3. The Chairperson, Board of Studies in Mathematics, KU
4. The Supervisors concerned
5. The Controller of Examinations KU
6. The Member In-charge, University Library, KU
7. The Deputy Registrar, Academic Branch, KU
8. The Secretary to Vice-Chancellor, KU
9. The SF

Study of Symmetrical and Anti-Symmetrical Edge Waves in Double Porosity Semi-Infinite thin Plate – Plane Stress Problem

D. Venkanna^{a,*}, and P. Malla Reddy^{b,**}

^aDepartment of Mathematics, Kakatiya Government College, Warangal, T.S., India

^bDepartment of Mathematics, Kakatiya University, Warangal, T.S., India

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Received October 19, 2021; revised December 13, 2021; accepted December 20, 2021

Abstract—This paper investigates the propagation of waves propagating near the edges of semi-infinite thin double porosity plate in the frame work of Biot's theory. The constitutive equations in the case of plane stress conditions are derived, and discussed. Frequency equations are derived for symmetric and anti-symmetric waves. It is obtained that the particle trajectory in the plane of plate is ellipse. Finally, the numerical results are computed for frequency against wavenumber, and then compared with that of the single porosity plate of the same material. It is seen that the phase velocity in the case of single porosity is higher than that of the double porosity.

Keywords: double porous solids, edge waves, plane stress problem, frequency equation, phase velocity, wavenumber

DOI: 10.3103/S0025654422030219

1. INTRODUCTION

Solid with only one type of porosity was considered by Biot [1], and proposed a theory under assumptions that (i) pores are identical and interconnected, (ii) pore fluid is homogeneous and incompressible, and follows Darcy's law, (iii) solid portion is isotropic. In the literature, there are many papers on wave propagation problems in isotropic poroelastic solids. It is well known that, in a classification, there are two types of problems. In one type, forces are so distributed that the nature waves is independent of coordinate. In second type, thickness of solid is so small that pertaining stress components vanish. These two situations are exploited in research to make three dimensional problems two dimensional to reduce mathematical complexity. In the present problem, thin isotropic plate is considered, so that problem becomes one of plane stress problems. The constitutive relations and equations of motion in single porosity solids under plane stress conditions are derived by Malla and Tajuddin [2]. The double porosity solid is the one in which small-scale porosity is pertaining to pores in the solid, and large-scale porosity is pertaining to fissures/cracks in the skeleton. The solids with double porosity are of interest in Geophysics, particularly, in Mining Engineering and Geology. Generally, Earth related solids are heterogeneous, porous, and often fractured or cracked. Rock pores and cracks can contain oil, gas, or water. These fluids are very important in real life and can be distinguished by their seismic signature which is a key issue in seismic exploration, and reservoir monitoring. It is responsibility of reservoir Engineer to understand the flow characteristics of these fluids. The approaches to seismic exploration is often made use of Biot's theory of Poroelasticity [3]. For a naturally fractured reservoir, unsteady-state flow in the reservoir has been investigated analytically [4, 5]. In the papers [6, 7], the approach had been limited mainly to modify the Biot's theory parameters for the introduction of micro cracks. For continuous pumping in oil and gas industry, it is necessary to account for pore-space reduction. Thus, multipermeability approach to the simulation of naturally fractured reservoir is studied [8, 9]. In fact, the pore pressure field may not be decoupled from the stress field in porous frame. On the other hand, in a porous composite between the solid deformation and the fluid flow, there exists a strong coupling. Hence, it becomes necessary to extend the Biot's concepts of single porous solid model to that of double porosity. In this context, the researchers made rigorous efforts in elastic wave propagation and attenuation in a double-porosity dual-permeability medium, which is an

STUDY OF NORMAL STRESSES IN DOUBLE POROSITY BORE

Venkanna D. and Malla Reddy P.*

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Kakatiya Government College,
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(Received: Mar. 15, 2022 Accepted: Jun. 18, 2022 Published: Jun. 30, 2022)

Special Issue

Proceedings of International Virtual Conference on
"Applied Mathematics and Computation- AMC- 2022"

Abstract: Normal stresses in a semi-infinite poroelastic wellbore (borehole) of double porosity solid are studied in the frame work of Biot's isotropic poroelastic theory. The radial normal stress is computed against aspect ratio in the case of Berea sandstone saturated with water, and Berea sandstone saturated with kerosene. Graphical representation of numerical results is given and then analyzed. From the figures, it is noticed that normal stress curves are symmetric.

Keywords and Phrases: Borehole, double porosity, normal stress, aspect ratio.
2020 Mathematics Subject Classification: 00A69.

1. Introduction

Boreholes are used in the exploration of natural resources including oil, gas, water and minerals. The boreholes must be enclosed with appropriate material to improve its stability. It has to withstand against the stresses exerted by surrounding medium. Therefore, the radial normal stresses around the borehole must be

Propagation of Vibrations in a Plane Angular Sector of Double Porosity Elliptic Cone



D. Venkanna¹ · M. Venugopal¹ · P. Malla Reddy²

Accepted: 29 December 2021

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Abstract

This paper deals with vibrations in a plane angular sector (PAS) of double porosity isotropic solids of elliptic cone shape. The frequency equation is obtained in the frame work of isotropic double porosity solids. This extended frame work was based on Biot's theory of isotropic single poroelastic solids. For illustration purpose, two materials namely, Berea sandstone saturated with kerosene and Berea sandstone saturated with water are used. The non-dimensionalisation of single porosity isotropic solids is extended here to double porosity isotropic solids. Non-dimensional phase velocity as a function of non-dimensional wavenumber is computed for various corner angles of PAS.

Keywords Double porosity · Elliptic cone · Plane angular sector · Frequency equation · Phase velocity · Wavenumber

Introduction

From the real time experiences, one may find the natural structures such as sedimentary rocks and some of the man-made structures in the shape of elliptic cone. Particularly, elliptical cone solids are useful in Aeronautical Engineering to decrease buoyancy forces, and are also useful in the Architectural Engineering. Even in man's own body some osseous tissues are almost in the shape of elliptic cone. The problem of scattering of waves in elliptic cone was first studied by Karus and Levis [1] by introducing the spheroconal coordinate system. In this coordinate system, the classical wave equation is separated into radial equation and angular equation. In the framework of Biot [2], the research work is extensively done in the cases of poroelastic cylinders and poroelastic half spaces by Tajuddin et al. [3–6]. Reddy and

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Published online: 19 February 2022

Springer

STUDY OF WAVE PROPAGATION IN
DOUBLE POROSITY SOLIDS

Thesis

Submitted to the Kakatiya University
Warangal



*in Partial Fulfilment of the Requirements
for the Award of the Degree of*

DOCTOR OF PHILOSOPHY
in
Mathematics

D. VENKANNA

Supervisor

Prof. P. Malla Reddy

Department of Mathematics
Kakatiya University
Warangal- 506 009
T.S., India
www.kakatiya.ac.in

June, 2022



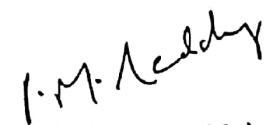


Certificate

This is to certify that the thesis entitled "Study of Wave Propagation in Double Porosity Solids" being submitted to Kakatiya University, Warangal by D. Venkanna in partial fulfilment of the requirements for the award of degree Doctor of Philosophy (Ph.D) in Mathematics, is a bonafide record of the work carried out by him under my guidance and supervision.

The results presented in this thesis have been verified, and are found to be satisfactory. The results embodied in this thesis have not been submitted to any other University for the award of any other degree or diploma.

Date: 13/6/2022


(Prof. P. Malla Reddy)
Advisor

Declaration

I hereby declare that the work which is being presented in this thesis entitled "Study of Wave Propagation in Double Porosity Solids" submitted towards partial fulfilment of the requirements for the award of degree Doctor of Philosophy (Ph.D) in Mathematics is an authentic record of my own work carried out under the supervision of Prof. P. Malla Reddy, Department of Mathematics, Kakatiya University.

To the best of my knowledge and belief, this work is no resemblance with any other material previously published except where due reference has been cited in the text.

Place: Warangal

Date: 13-6-22



D. Venkanna

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