3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five year

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Calendar Year of publication	ISBN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Indrajeet Kumar	National Conference on Recent Advances in Traffic Engineering	Study of Driver Behavior in Overtaking Manoeuvres on Undivided Road in Indian Context	Recent Advances in Traffic Engineering.	Springer	International	2024	978-981-99-4464-4	SITYOG INSTITUTE OF TECHNOLOGY	Springer, Singapore
2	Suraj	Intelligent Sustainable System	Design of a CPW-Fed Microstrip Elliptical Patch UWB Range Antenna for 5G Communication Application	Intelligent Sustainable Systems.	Springer	International	2022	978-981-16-6369-7	SITYOG INSTITUTE OF TECHNOLOGY	Springer, Singapore
3	Suraj	Materials Today Proceedings	Effect of change of material model in Mooney Rivlin hyper-elastic material.	Materials Today: Proceedings	Elsevier	International	2020		Swami Vivekanand Subharti University	Elsevier
4	Ashwini Mishra	Proceeding of 4th Women IEEE conf.	Electric Power Generation from Piezoelectric System under Several Configurations	In Proceeding of 4th Women IEEE conf.	IEEE	International	2018	978-1-5386-4491-1	Galgotias University	GUCON

5	Neeraj Kumar	International Gas Turbine Institute	Leakage Based Condition Monitoring and Pressure Control of the Swashplate Axial Piston Pump	Proceedings of the ASME 2019 Gas Turbine India Conference.	Gas turbine india conference	International	2019	978-0-7918-8353-2		The american society of mechanical engineers
6	Neeraj Kumar	Advances in Mechanical Engineering Series	Adaptive control of the wind terbine transmission system for smooth power generation.	Lecture Notes in Mechanical Engineering. Springer, Singapore.	Springer	International	2020	978-981-15-0124	SITYOG INSTITUTE OF TECHNOLOGY	Springer, Singapore
7	Neeraj Kumar	Advances in Mechanical Engineering Series	Adaptive control of the wind terbine transmission system for smooth power generation.	Lecture Notes in Mechanical Engineering. Springer, Singapore.	Springer	International	2020	978-981-15-0124	SITYOG INSTITUTE OF TECHNOLOGY	Springer, Singapore
8	Neeraj Kumar	Advances in Mechanical Engineering Series	Recent Development and Application of the Hydrostatic Transmission System	Lecture Notes in Mechanical Engineering. Springer, Singapore.	Springer	International	2020	978-981-15-0124	SITYOG INSTITUTE OF TECHNOLOGY	Springer, Singapore

Design of a CPW-Fed Microstrip Elliptical Patch UWB Range Antenna for 5G Communication Application

Abhishek Kumar, Garima Jain, Suraj, Prakhar Jindal, Vishwas Mishra, and Shyam Akashe

Abstract These day, due to tremendous growth of wireless communication and the need for higher data transfer rates and portable and compact devices, the need for antenna with a simple design, small size, reliable radiation pattern while retaining an incredibly large frequency spectrum is on high demand. However, Ultra-Wide Band (UWB) antenna design is particularly challenging for portable devices. Nevertheless, UWB antenna design faces several challenges especially for portable devices, containing the UWB quality of impedance matching, small antenna size, constant group delay, radiation stability, and low production costs, etc., for consumer usage. Because of their low profile, broad impedance bandwidth and compact design, ease of fabrication, etc. Today, Ultra-Wide-Band antennas (UWB) have been analyzed and their features explored in the future wireless communication of the fifth generation (5G). The antennas are called planned and the scale should be minimal, so that the geometry in the 5G candidate frequency bands will be properly optimized to operate within an ultra-wide frequency band. Microstrip antenna are very successful candidates for wireless communication systems. In this research paper, by using UWB Application, we proposed a novel concept design and study of a coplanar wave guide (CPW) fed UWB for 5G. Our proposed patch antenna is elliptical in shape that offers

A. Kumar (✉) · V. Mishra
Swami Vivekanand Subharti University, Meerut, Uttar Pradesh, India

G. Jain
Noida Institute of Engineering and Technology, Greater Noida, India

Suraj
NIT Patna, Patna, Bihar, India
e-mail: suraj.ph21.me@nitp.ac.in

P. Jindal
Amity University, Gurugram, Haryana, India
e-mail: pjindal@ggn.amity.edu

S. Akashe
ITM University, Gwalior, Madhya Pradesh, India
e-mail: shyam.akashe@itmuniversity.ac.in

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Effect of change of material model in Mooney Rivlin hyper-elastic material

Suraj [a,*], Abhishek Kumar [a], Bikas Prasad [b], Kaushik Kumar [c]

[a] Swami Vivekanand Subharti University, Meerut, UP 250005, India
[b] Govt. Polytechnic, Dheri-On-Sone, Rohtas, Bihar 821307, India
[c] Birla Institute of Technology, Mesra, Ranchi 835215, India

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ABSTRACT

In this research paper, inflation of circular membrane bounded at periphery has been analysed. Using an appropriate boundary condition, inflation problem has been reduced to a set of three 1st ordinary DE (differential equation). Hyper-elastic material which has been taken for inflation in this paper is Mooney Rivlin hyper-elastic Material. The effect of change of material model 'α' on pressure at different principal stretch ratio 'λ_0' and principal stress with radial coordinate 'r' has been shown. How the change of material model plays an important role for inflation of hyper-elastic material has been studied in this paper.

Selection and of the scientific committee of the 10th International Conference of Materials Processing and Characterization.

1. Introduction

Due to numerous advantages, hyper-elastic membrane structures are widely used in space applications (thermal shield), architecture and civil structure (air supported structures that can be seen in [6]), mechanical engineering (airbags) and medical engineering (stent expansion in balloon angiography). Hyper-elastic is just the name that is given for elastic materials and usually we refer to them when they undergo large deformations as mentioned in [1]. As we know in elastic material$\sigma = E\varepsilon$, this linear elastic rule is valid for all metals, whether it is steel, copper or aluminium etc. Here value of E changes from one material to another. So in case of hyper-elastic material we have strain energy function ψ that varies for different hyper-elastic material as mentioned in [7]. Many studies are done on inflation of hyper-elastic material with different geometries of membrane that can be seen in [4,2], inflated membrane behavior when comes in contact with different rigid geometries can be seen in [3,8], inflated membrane in contact with rigid geometry is also related with thermoforming in [5] and effect of pre-stretch on complete stretching after inflation is shown in [9].

Inflation of hyper-elastic material of different geometry and in contact with different rigid geometry is studied well with taking a particular value of material model. All studies till now were focused on deformation after inflation with or without external contact with rigid bodies and in pre-stretch condition but the effect on inflating pressure with higher value of material model at different principal stretch ratio 'λ_0' and principal stress with radial coordinate 'r' is not yet examined. To understand basic of hyper-elastic material we should know that material to be elastic, is to say that material dissipate energy. Dissipation to be consisting of two forms P and Fwhere P is Piola-Kirchoff stress. Here we introduce ψ which is Helmholtz free energy called as strain energy.

$$D = (P : \dot{F} - \dot{\psi}) \tag{1}$$

If we remove all the thermal terms we will find this term should be greater than or equal to zero. Then there is no dissipation of energy which means that process is completely reversible.

$$D = (P : \dot{F} - \dot{\psi}) = 0 \tag{2}$$

ψ is the function of deformation (F), so Eq. (2) can be written as

$$\begin{gathered} P : \dot{F} - \frac{\partial\psi(F)}{\partial F} : \dot{F} = 0 \\ \left(P - \frac{\partial\psi(F)}{\partial F}\right) : \dot{F} = 0 \end{gathered} \tag{3}$$

This (Eq. (3)) leads us to an important relationship which can be written as

$$\begin{gathered} P - \frac{\partial\psi(F)}{\partial F} = 0 \\ P = \frac{\partial\psi(F)}{\partial F} \end{gathered} \tag{4}$$

* Corresponding author.

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Electric Power Generation from Piezoelectric System under Several Configurations

Shivi,
SEECE,
Galgotias University,
Greater Noida, India.
roy.shivi1101@gmail.com

Lokesh Varshney,
SEECE,
Galgotias University,
Greater Noida, India.
lokesh.varshney@gmail.com

Ashwini Mishra,
SEECE,
Galgotias University,
Greater Noida, India.
mishraashwini48@gmail.com

Sapna Joshi,
SEECE,
Galgotias University,
Greater Noida, India.
sjoshi051994@gmail.com

Abstract—**The energy yield of the piezoelectric system is reduced during partial vibration. The system has deteriorated performance during partial vibration condition. Several conditions are responsible for the losses during partial vibration condition. These losses are depending on the pattern of vibration, configuration of system and the physical location of the partially vibrated modules in the system. In this paper, several methods are presented to configure the system so that the generation under partial vibration condition is improved. In this approach, the piezoelectric system is connected in various patterns to improve the overall generation from the system during various vibration conditions.**

Keywords—piezoelectric system; configuration; partial vibration

I. INTRODUCTION

The requirement of energy is keep growing with time but the conventional energy resources are depleting at an alarming rate. The over depletion of non-renewable energy sources cause huge environmental problems, which attract the inventors towards the alternative resource for energy generation[1]-[2]. Ambient vibration is gathering a special attention for energy generation which is an effective and eco-friendly way to fulfil the energy demands to some extent. The piezoelectric (PZT) systems are successfully installed for various different sites and working efficiently.

Some certain solid materials, such as crystals, certain ceramics etc. accumulate the electric charge in response to mechanical stress applied on it. Piezoelectricity means electricity produced by applying ambient pressure, discovered by French physicist Jacques and Pierre Curie in 1880. It is a reversible process, the converse of which was given in 1881, by Gabriel Lippman [3].

There are various configurations which are used to fulfil the power requirements. In general arrays of the system are connected in series, parallel, and series-parallel. The vibration on the entire system is considered to be uniform in ideal case, but practically, the system never gets the vibration uniformly, which leads to the condition of partial vibration. During the partial vibration condition there are losses in the system. These losses are depending on the pattern of vibration, configuration of the system and the physical location of the partially vibrated modules in the system. Different system configurations have been proposed till now to reduce the loss in the system during partial vibration condition. Simple Series, simple parallel, Series–Parallel (SP), Total Cross Tied (TCT), Honey Comb (HC) and Bridge Linked (BL) are some of the configurations which are compared in photovoltaic (PV) system during partial shading condition for their losses, maximum power, fill factor, reliability and energy yield. During partial shading TCT scheme delivers the highest power and considered as the best configuration to get maximum output power and fill factor over SP and HC in PV system [4]-[8]. Based on these, some of the configurations are studied for PZT system in this paper.

This paper focuses on the arrangement of the PZT array on the basis different configurations including HC and BL. Also the comparison of power has been done for various configurations under uniform and partial vibration condition.

The content in further sections of this paper is: the basic PZT system, followed by the description of partial vibration phenomenon, the experimental setup and the brief discussion on the different configurations during uniform and partial vibration condition.

II. SYSTEM DESCRIPTION

The electrical equivalent circuit of a general PZT device is shown in *Fig. 1*, explained by Keawboonchuay*et. al*[9].

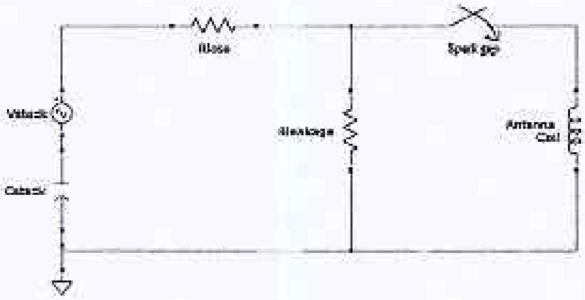

Fig. 1. Equivalent circuit of a piezoelectric device.

The capacitance C_{stack} formed in the modelling of PZT device is given, as in (1).

$$C_{stack} = \frac{\varepsilon_r \varepsilon_0 A}{h_{piezo}} \tag{1}$$

Where ε_0 is the permittivity of the free space, $\varepsilon_r$is the relative permittivity of the PZT material, A is the surface area of the PZT material and h_{piezo} is the thickness of the PZT material.

There will be some resistive losses and some leakage in the circuit due to the presence of the resistance. The value of R_{loss} and $R_{leakage}$ changes on the basis of the size of the material. A voltage source V_{stack} is added in series to account for the voltage generated by compression of PZT material [10]-[11].

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LEAKAGE BASED CONDITION MONITORING AND PRESSURE CONTROL OF THE SWASHPLATE AXIAL PISTON PUMP

Neeraj Kumar*
Department of Mechanical Engineering
National Institute of Technology Meghalaya
Shillong-793003, Meghalaya, India
Email: neeraj.kumar@nitm.ac.in

Bikash Kumar Sarkar
Department of Mechanical Engineering
National Institute of Technology Meghalaya
Shillong-793003, Meghalaya, India
Email: bikash.kumar@nitm.ac.in

Subhendu Maity
Department of Mechanical Engineering
National Institute of Technology Meghalaya
Shillong-793003, Meghalaya, India
Email: subhendu.maity@nitm.ac.in

ABSTRACT

This research mainly focused on the axial piston variable displacement pump, which is the most important part of the fluid power system. The variable displacement axial piston has been found as versatile and flexible for electro-hydraulic applications. Heavy industries such as automobile, aircraft, and mining use an axial piston pump due to its high power to weight ratio, continuous variable power transmission, low inertia, self-lubricating properties, and good controllability. The main challenges with the hydraulic system are highly nonlinear, leakages, unknown external disturbance, etc. The mathematical model of the variable displacement pump along with swashplate control has been developed. The model is used to identify the pump health condition with pressure and flow measurement, i.e., ripple pattern. The pressure and flow ripple will vary from the regular pattern due to wear and tear, i.e., increased leakage flow. The main source of the increase in leakage flow is due to wear in piston and cylinder bore. The piston chamber pressure, kinematical flow, and discharge area model of the pump has been validated with the existing results. The pump pressure control is very much essential for the enhancement of the performance of the electro-hydraulic system. In the present study, a conventional PID controller has been used as a backup to maintain system performance within the permissible faults. The electro-hydraulic system has been employed for swash-plate control of the pump to obtain desire pressure flow at the exit of the pump. MATLAB Simulink has been used for the simulation study of the pump.

*Address all correspondence to this author.

Keywords: Condition monitoring, Electro-hydraulic system, PID controller, MATLAB Simulink.

NOMENCLATURE

Symbol	*Description*
A_c, A_b	Area of control piston and bias piston respectively
A_1	Effective piston area cap end
A_2	Effective piston area rod end
A_p	Area of the piston
A_v	Discharge orifice area of needle valve
B	Bulk modulus of the fluid
C_{d1}	Coefficient of flow discharge
C_{d2}	Coefficient of discharge
F_a	Nominal spring load of the bias piston when angle of swash plate is zero
F_b	Force is exerted by the bias actuator on the swash plate
F_c	Force is exerted by the control actuator on the swash plate
F_f	Frictional force generated in the hydraulic actuator
L_o	Initial length of the leakage passage
L	length of the bias and control actuator
M_p	Mass of the piston
M_s	Mass of the Slipper

Author Proof

Adaptive Control of the Wind Turbine Transmission System for Smooth Power Generation

Neeraj Kumar, Emanuel Khraw Mawsor and Bikash Kumar Sarkar

Abstract Wind energy sector is growing rapidly now a day's as compared to other renewable sources of energy. The energy conversion from wind to electrical energy through hydrostatic transmission (HST) has been studied. The hydrostatic transmission system has been used for the power transfer from low-speed wind turbine rotor shaft to a high-speed generator shaft using variable displacement axial piston pump and motor. A fuzzy PID controller has been used to control the rotational speed of the pump and motor by controlling the displacement ratio. The hydraulic and overall efficiency has found to be approximately 82.2% and 38.8%, respectively. The performance of present dual control system has been found quite satisfactory as it is capable of maintaining output motor speed better compare to the single control mode. The constant output motor speed ensure quality power output in fluctuating wind speed and gusts.

Keywords Controller · Hydrostatic transmission · Wind turbine

Nomenclature

A_r	Area of pressure relief valve (m^2)
$D_p$max	Maximum pump displacements (m^3)
$D_m$max	Maximum motor displacements (m^3)
ΔP	Pressure difference between pump/motor (Pa)
P_s	Supply pressure (Pa)
P_h	High-pressure (Pa)

N. Kumar (✉) · E. K. Mawsor · B. K. Sarkar
Department of Mechanical Engineering, NIT Meghalaya, Shillong 793003, India
e-mail: yadavjink@gmail.com

E. K. Mawsor
e-mail: khrawgmawsor@gmail.com

B. K. Sarkar
e-mail: bikash.sarkar@nitm.ac.in

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Offshore Wind Turbine Pitch Control with Aeroelastic Effect

Jyotipriyam Baruah
Department of Mechanical Engineering
NIT Meghalaya,
Shillong- 793003

Paladugu Venkaiah
Department of Mechanical Engineering
NIT Meghalaya,
Shillong- 793003

Neeraj Kumar
Department of Mechanical Engineering
NIT Meghalaya,
Shillong- 793003

Bikash Kumar Sarkar*, *Member IEEE*
Department of Mechanical Engineering
NIT Meghalaya,
Shillong- 793003
bikash.sarkar@nitm.ac.in

Nur Alom
Department of Mechanical Engineering
NIT Meghalaya,
Shillong- 793003

Abstract - **Recently researchers are put more attention to offshore wind turbine development compared to the onshore wind power system due to available potential, steady wind compared to onshore, does not disturb human activity etc. The recent trend is to increase the size of the turbine, which reduces the cost of generation of power compared to the existing power generating units. The turbine blades have become more flexible with the increase of turbine size. It has been observed large blade deformation with the increase of turbine size even under normal operating conditions. The increased turbine size and more turbine blade deformation aerodynamic load on the turbine blade become essential to consider the aero-elastic effect for large offshore wind turbine system controller design. The present study focuses on the development of a nonlinear model of the offshore wind turbine with the consideration of the aeroelastic effect. The wind turbine model has been integrated with an electrohydraulic pitch actuating system model. The turbine model has been used for study pitch control applications. An adaptive controller has been developed for turbine pitch control to regulate rated power of the horizontal axis wind turbine with the consideration of the aero elastic effect. The simulation study has been performed in Matlab Simulink environment with a standard test signal and actual wind data.**

Index Terms - Control, electrohydraulic, flutter, wind turbine.

I. INTRODUCTION

The wind energy system has become one of the fastest-growing energy sector due to available potential, flexibility, economic and environmental benefit, sustainability etc [1]. Wind turbines can be classified based on the installation and operation as (a) horizontal axis wind turbine and (b) vertical axis wind turbine. Researchers are put effort into pitch control in each [2]–[4] type of turbine to improve system performance and reduce production cost. Based on the diameter the horizontal axis wind turbine can be classified as a microturbine having a diameter less than 0.1m, small size turbine having a diameter within 0.1m to 1m, medium-size turbine with rotor diameter within 1m to 5m and large size turbine with a rotor diameter more than 5m [5]. The recent trend is to develop large size turbine with higher diameter. The big-size wind turbine is more suitable for offshore application. Improvement of the offshore wind turbine system become a center of attraction due to the increasing demand for renewable energy. The global offshore wind energy has expanded 30% per year since 2010 as per the International Energy Agency. The main aim is to absorb maximum power by the turbine system in region II and track of rated power in region III. In region III blade pitch control has to be employed to regulate rated power along with structural safety. The main structural load arises in the wind turbine system due to the aerodynamic force in the turbine blade. The blade aerodynamics load can be regulated by the pitch control technique.

Offshore wind turbine installation is become more popular in recent days compared to the onshore wind turbine due to more area availability, better wind potential availability, steady wind, no noise and visual effect. Most of the offshore wind turbines are available with the fixed bottom. It has been observed if the depth of water has been more than 60m, floating offshore wind turbine has been more economical compared to the onshore wind turbine. The floating offshore wind turbine consists of the mooring, floating spar, turbine tower, rotor and Nusselt. The floating offshore wind turbine dynamics is quite complex due to aerodynamic load, hydrodynamic load and mooring load.

The recent trend is to increase the size of the turbine, which reduces the cost of generation of power compared to the existing power generating units. The turbine blades have become more flexible with the increase of turbine size. It has been observed large blade deformation with the increase of turbine size even under normal operating conditions [6], [7]. The large flexible turbine blades vibrates along with the deformation which changes flow field and and redistribution of the force on the surface of the blade happens, which reffered as aeroelastic effect [1]. The increased turbine size and more turbine blade deformation aerodynamic load on the turbine blade become essential to consider the aero-elastic effect for large offshore horizontal axis wind turbine system controller design. It has been observed the turbine blades are not experienced by uniform load throughout as the wind velocity not constant with the increase of height from the sea surface. With this consideration some researchers are reported indivisual pitch control approach.

Researchers have reported pitch control techniques with different objectives and controller design approaches. Researchers are proposed various controller design approaches

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Author Proof

Recent Development and Application of the Hydrostatic Transmission System

Neeraj Kumar, Bikash Kumar Sarkar and Subhendu Maity

Abstract This paper presents a review on the recent development of hydrostatic transmission system and its applications. A hydrostatic transmission is used for transmission of energy with infinite transmission ratio. The hydrostatic transmission classification, application in automobiles, wind turbines have been discussed. Various hydrostatic transmission circuits have been added in order to understand the applications in different field. This paper also reviews method and designing of recent studies on hydrostatic transmission system. A simplified model has been considered to study the performance of the system. The simulation has been carried out in Matlab Simulink environment. The simulation result clearly shows that by using an accumulator the overall efficiency has been increased and reaches maximum about 94.2% without considering the internal leakages. AQ1

Keywords Hydrostatic transmission system · Wind turbine · Hydraulic pump · Matlab simulink

Nomenclature

a	Constant (Dimensionless)
b	Constant (Dimensionless)
D	Displacement of motor/pump (rev/min)
E	Energy stored in accumulator (N-m)
ΔP	Pressure difference across motor/pump (Pa)
Q	Flow rate of motor/pump (m^{3}sec)

N. Kumar (✉) · B. K. Sarkar · S. Maity
Department of Mechanical Engineering, NIT, Meghalaya Shillong 793003, India
e-mail: yadavjink@gmail.com

B. K. Sarkar
e-mail: bikash.sarkar@nitm.ac.in

S. Maity
e-mail: subhendu.maity@nitm.ac.in

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