The Role and Impact of Social Media on Online Social Movements: An Analysis of 'ALS Ice Bucket Challenge' in India

PARTHASARATHI, Dr.

Department of Physics
Maharaja Agrasen College
University of Delhi, Delhi, India
E-mail: parthasarthi@mac.du.ac.in

Grishma KUMARI

Corporate Communication
National Thermal Power Corporation, Vindhyachal, India

Abstract. *Online social movements have taken root and flourished in the last decade due to online communication networks attributed to Social media. In this paper, the mixed-method approach is utilized for qualitative and quantitative analysis to investigate the efficacy of social media in propounding the outcome of online social movements in India. Further, several factors which have a definite impact on the outcomes of such online social movements are highlighted. This study concludes that online social media campaigns can be viewed as an extension of 'social norms media campaigns'. Further, it establishes that the internet penetration in India coupled with 'online peer pressure' accompanying such movements has effectively aroused the consciousness of users towards such campaigns. It also highlights the alteration in the process of diffusion of ideas in society due to the advent of social media platforms.*

Keywords: Online campaigns; Diffusion theory; Mixed-method approach; Survey method; Social media.

DOI: 10.24193/jmr.39.7
Published First Online: March 2021

Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/13241
DOI URL: http://dx.doi.org/10.21474/IJAR01/13241

RESEARCH ARTICLE

TESTING THE EFFICACY OF VIRTUAL LABS IN INDIA FOR SIMULATION OF OPTICS EXPERIMENTS AT THE UNDERGRADUATE LEVEL

Dr. Parthasarathi
Department of Physics, Maharaja Agrasen College, Vasundhara Enclave, Delhi University, Delhi.

Manuscript Info

Manuscript History
Received: 05 June 2021
Final Accepted: 09 July 2021
Published: August 2021

Keywords:
Science Curriculum, Experiments, Virtual Laboratories, Remote Laboratories, Simulations, Optics Laboratory

Abstract

Laboratory experimentation isan important ingredient of every undergraduate program in science education. The use of virtual and remote laboratories (VRLs) offers several benefits to students, teachers, and instructors. It can mitigate the high costs of procurement of apparatus in traditional labs and can support distance and blended learning. The recent outbreak of Covid-19 has resulted in isolating the students from labs which have made such online laboratories imperative even in the traditional offline education system. They offer a possible alternative to conventional hands-on labs. Such online mode imparts freedom to teachers as well as students to define their experimental goals and objectives. This paper tests the efficacy of the 'Virtual Labs' platform for conducting simulated experiments onlinein the field of Optics. The learning outcome of the students who employ the same to simulate experiments online is analyzed. The main objective is to explore the limitations posed to the users of such an online lab platform in terms of designing the experimentsand visualization of the experiment results and offer suggestions to make such VRLs more efficacious, versatile, and user-friendly.

Introduction:-

Classrooms are complex, multi-faceted, and demanding places in which to work and successful pedagogies are correspondingly sophisticated. Highly successful pedagogies develop when teachers make outstanding use of knowledge-base for teaching to support high-quality planning and practice. The very best teaching arises when this knowledge base is supplemented by Educational technology (abbreviated as EdTech) which involves the combination of computer hardware, software, and educational theory and practice to facilitate learning (Robinson et.al., 2008).The use of Web CT, now incorporated into Blackboard Inc., began a revolution of using the Internet to deliver learning(Bates, 2005) making heavy use of web-based training, online distance learning, and online discussion between students(Harasim et. al, 1998). With the optimum use of such technologies, the teaching instructions are designed to address what and how the subject is to be taught to meet the aspirations of learners.

The use of virtual and remote laboratories (VRLs) for undergraduate science courses in a recent phenomenon particularly in developing countries. They have multiple benefits including cost savings in equipment, space, and maintenance staff, a greater possibility of visualization and freedom of design od experiments that would not be possible in a traditional hands-on laboratory, and to carry out a large number of simulations without any restriction (Heradio et al. (2016)). Images or animations used in VRLsprovide users with a greater understanding of the system

Corresponding Author:- Dr. Parthasarathi
Address:- Department of Physics, Maharaja Agrasen College, Vasundhara Enclave, Delhi University, Delhi.

Journal of Development Communication, Volume 32 (1)

CASE STUDY

THE MUTEDNESS OF A GROUP OF LOCAL ENTREPRENEURS IN INDIAN STATE OF ODISHA AND ITS IMPACT ON THE SKILL DEVELOPMENT INITIATIVES OF THE STATE

Parthasarathi
Department of Physics, Maharaja Agrasen College, University of Delhi, Delhi, India
parthasarthi@mac.du.ac.in

Grishma Kumari
Corporate Communication, NTPC, Vindhyachal, India
grishmakumari6@gmail.com

Abstract

This study utilises muted group theory to understand the impact bureaucratic structure has on local entrepreneurs when policymaking is influenced by dominating groups, viz the corporate lobbies. Muted group theory is used to define the characteristics of decision-making to favour a few at the expense of a group of individuals who have the relevant technical expertise but lack their say in the policy formulation of the state. The premises of the theory focus on the lack of underrepresented voices present in policies, structures, and organisations. To gain clarity on the experiences of these entrepreneurs, a thorough case study is presented and analysed on the process of the muting of a class of local entrepreneurs and its impact at the local and national level. The findings in this research indicate the importance of representation of local elements in the decision-making process in bureaucratic structures to accommodate the concerns and aspirations of the masses and to highlight the adverse impact of muted ness of entrepreneurs in the progress of the society.

Keywords: muted group theory, entrepreneurs, bureaucracy, power structure, corporate lobbies, skill development, government policies

Introduction

Muted group theory echoes across all cultures and societies and specifically targets groups of marginalised sections of people. Although the original theory explicitly focused on communication between women and men, it has found application across multiple socio-economic groups transgressing every section and sub-sections of the society. Muted group theory identifies problems within the status quo that enable the silencing of underrepresented groups and offers ways to address the issue (West & Turner, 2010). Ardener (2005) emphasised that muting by dominant groups through control of dominant discourse is reinforced through and entrenched in various social spaces. These spaces include prominent organisations emphasising a structure of power and engaged in policy formulations where voices of the affected local populace go unnoticed or unheard. Muted group theory focuses its attention on the lack of voice of underrepresented groups, as well as resistance and silencing (Kramarae, 1981). Four main premises are derived from the muted group theory. Firstly, the members from different groups have varying experiences that alter their perceptions of the world. Experiences are often interpreted differently for them by others within an organisation (Kramarae, 2005). Because dominant and sub-dominant groups are afforded different experiences, they perceive the world differently (Wall & Gannon-Leary, 1999). The dominant group, however, is privileged to create and define terms. These

Comparative study of thermoplasmonic effects of gold and silver metal nanoparticle

Cite as: AIP Advances 11, 045323 (2021); doi: 10.1063/5.0046284
Submitted: 11 February 2021 • Accepted: 1 April 2021 •
Published Online: 20 April 2021

Nilesh Kumar Pathak,[1,a)] Partha Sarathi,[1] and Gyanendra Krishna Pandey[2]

AFFILIATIONS

[1] Department of Physics, Maharaja Agrasen College, University of Delhi, Delhi 110096, India
[2] Department of Physics, Shivaji College, University of Delhi, Delhi 110027, India

[a)] Author to whom correspondence should be addressed: nileshpiitd@gmail.com

ABSTRACT

We investigated the plasmonic heating effect of noble metal nanoparticles in a water environment using the first-principles approach. In this approach, we have solved the heat transfer equation in the steady state to obtain the heat generation and temperature profile corresponding to two different types of metals. Metals exhibited a surface plasmon resonance property in which maximum absorption of light for smaller size nanoparticles is observed, which can be used to heat up the surrounding environment. Inspired by the same, we have simulated the absorption cross section of different sizes of a metal nanosphere and observed the threshold value of the radius below which absorption is dominant. The maximum absorption of light by the nanosphere produces a hotspot, which can be visualized in terms of the electric field distribution plot. This electric field distribution profile of silver and gold metal nanoparticles is computed under the resonance wavelength using the boundary element method The results thus obtained in terms of the optical cross section are compared with those of the numerical model to establish their veracity. These theoretical works aim to further develop the fundamental understanding of the heating mechanism of plasmonic geometries, which can be used in several applications.

I. INTRODUCTION

The advantages of heat generation in plasmonic nanoparticles induced by light absorption were highlighted in several studies; efforts to demonstrate new vistas of practical applications of the emerging subject of *thermoplasmonics* in numerous fields has been the subject of investigation by many researchers.[1–4] The thermoplasmonic effect of a metal nanoparticle (MNP) having a wide range of applications has been studied in the last two decades using semianalytical, numerical, and experimental approaches. There exist several branches of science that feature thermal-induced processes that include thermodynamics, chemical synthesis, fluid dynamics, phase transitions, and cell biology. This also encompasses subject areas of nanotechnology, nanothermodynamics, and nano-optics. They find potential applications in emerging fields of photothermal cancer therapy,[5–8] drug delivery, materials science,[9–11] nanofluidics,[12,13] and phononics.[14–16] This explains the interest that the field of thermoplasmonics has generated in the last decade, motivating researchers from physics, chemistry, and biology working at the interface between nano-optics and thermodynamics. The heating of the nanoparticle gives rise to a variety of subsequent processes in the surrounding environment that include nanobubble formation, stress wave generation, enhancement of chemical reactions, microscale fluid convection, enhanced Brownian motion, liquid superheating (i.e., heating above the boiling point of a liquid without boiling), thermal radiation, microscale thermophoresis of colloids and biomolecules, and modification of the metabolism of living cells. All these processes have been at the basis of research studies and recent applications, as enumerated in Sec. II.

Due to large absorption cross sections, optically excited nanostructures lead to efficient heat generation, the strength and localization of which are strongly dependent on the geometry and composition of plasmonic nanostructures.[17,18] The regimes of optical heating of nanostructures can be collective or local whose heating mechanisms depend on the composition and dimensions of nanostructures,[19,20] whereas the temperature distribution and the efficiency of temperature generation depend on their shape.[21,22] Collective heating is realized in a large and dense ensemble of nanoparticles (NPs)

Journal of Physics Communications

OPEN ACCESS

RECEIVED
19 April 2021

REVISED
19 May 2021

ACCEPTED FOR PUBLICATION
2 June 2021

PUBLISHED
11 June 2021

PAPER

Application of exact solution of complex morse potential to investigate physical systems with complex and negative masses

Partha Sarathi and Nilesh Kumar Pathak

Department of Physics, Maharaja Agrasen College, University of Delhi, Vasundhara Enclave, Delhi-110096, India

E-mail: parthasarthi@mac.du.ac.in

Keywords: Schrodinger equation, exact solution, real eigenvalues, Complex Morse Potential, Negative mass, complex mass

Abstract

The interest in the study of physical systems characterized by negative and effective negative masses and their behaviour has been a subject of investigation by several researchers. The focus of the majority of these studies is experimental in nature. Inspired by the same, we have solved the Schrodinger equation for complex Morse potential with negative and complex masses and obtained its exact solution. The normalized eigenfunction and eigenvalues are obtained and the condition for admissibility of the reality of eigenvalue spectrum for the ground state of complex Morse potential has been discussed. This study establishes that it is indeed feasible for such negative masses proposed in the literature for various physical systems to be bound together by complex Morse potential. Further, we propose that atoms with complex and negative masses may bind together under the action of complex Morse-like potentials and form molecular structures.

1. Introduction

Although the theories and discussion on the admissibility of negative masses in physical systems [1–19] date back to the 19th century particularly in the field of cosmology and condensed matter physics, recent studies suggest that the Universe comprise masses that are negative that can explain many existing mysteries of the physical world. These findings suggest that the understanding of our Universe requires a superseding theory based on negative masses and effective negative masses.

The mysterious nature of dark energy and dark matter that constitute 95% of the observable Universe has yet to find satisfactory explanations using conventional Cosmological theories. The issue of negative mass was brought forth in cosmology by the discovery of the accelerated cosmological expansion and its association with mysterious dark energy and the cosmological constant [20, 21]. The negative-mass cosmologies attempt to explain dark energy as a repulsive form of gravity an extension of general relativity with positive and negative mass distributions. Researchers have proposed a cosmology that incorporated positive-mass matter into a sea of negative-mass anti-matter [10, 22, 23]. There has been an attempt to construct a cosmological model based on modified ΛCDM cosmology to incorporate both dark phenomena into a single negative mass fluid [24] that proposes continuous-creation of negative masses which resemble the cosmological constant and can flatten the rotation curves of galaxies. Efforts have also been made to construct the model with negative gravitational mass in the context of Newtonian gravity [25] that reproduces the features of the so-called Dirac-Milne Universe, a matter-antimatter symmetric universe that was recently proposed as an alternative cosmological scenario [23].

The recent advances in the development of metamaterials with negative effective mass have demonstrated the efficacy of negative masses in real physical systems [26–28]. These negative mass materials find numerous applications in acoustic tunneling through narrow channels, control of the radiation field, transmission through sharp corners, and power splitting [29]. Elastic wave control and seismic wave protection with acoustic metamaterials possessing the negative mass (density) are also proposed in the literature [30].

The emergence of position-dependent mass, quantum mechanics has renewed interest in investigating the same for Morse-like potentials in the real domain. The exact solutions of the Schrödinger equation characterized by position-dependent effective mass via point canonical transformations [31] for the Morse and Morse-like

NANO EXPRESS

OPEN ACCESS

RECEIVED
12 August 2021

REVISED
28 October 2021

ACCEPTED FOR PUBLICATION
7 November 2021

PUBLISHED
18 November 2021

PAPER

Study of thermoplasmonic properties of gold nanodimer in visible -infrared region of electromagnetic spectrum

Nilesh Kumar Pathak and Partha Sarathi

Department of Physics, Maharaja Agrasen College, University of Delhi, Delhi-110096, India

E-mail: nileshpiitd@gmail.com

Keywords: plasmonics, nanoheater, SPR, nanodimer, absorption cross-section, thermoplasmonics

Abstract

In the present study, the heat generation in gold nanodimer when irradiated at their localized surface plasmon resonances is investigated numerically. The theoretical calculations are performed employing the first principal approach to obtain the absorption cross-section of gold nanodimer for different parameter ranges. The heating mechanism is enumerated in terms of its temperature by solving the steady-state heat transfer equation which depends on the absorption cross-section and surface plasmon resonance wavelength. These surface plasmon resonances are quite sensitive to the distance between the dimer and have been tuned from visible to IR range by managing the distance between spheres from 0 to 6 nm. The computation of normalized electric field distribution of gold nanodimer under the plasmon resonance has been mapped using boundary element method(BEM) which enables visualization of the local hot spot that plays a significant role in optical heating applications. The work furnishes the basic understanding of the heating mechanism of gold nanodimer which can find application as plasmonic nanoheaters in several branches of science in visible and near-infrared regions of the electromagnetic spectrum.

1. Introduction

Recently, it has been observed in several studies that metallic nanoparticles (NPs) which support surface plasmon resonances exhibit vast potential in optical heating applications. The heat generation via metal nanostructures induced by light absorption has long been considered as a negative effect that needs to be eliminated [1–6]. To change this notion in the context of metal, several efforts have been carried out in recent years which demonstrated that metal nanostructure can be used as a nanoheaters and opens up new avenues in the field of nanotechnology research [7–10]. This new field, which encompasses studying the combined effect of nano-optics and thermodynamics has been termed thermoplasmonics[11–13]. Several potential applications of the phenomenon of thermoplasmonics in nanotechnology have been highlighted [14–16]. These include diverse fields like nanofluids, phononics, photothermal cancer therapy, and imaging [17–19]. In photothermal tumor therapy, the laser impinges on the metallic nanoparticles which produce heat that stops the cellular activity either by shrinking the size of the tumor or decreasing the spread of cancerous cells [20–22]. The increase in temperature of metallic nanoparticles is caused by the absorption of light due to local surface plasmon resonance (SPR) which produces a large electromagnetic field at the vicinity of the nanoparticle surface. The physics of surface plasmon resonances and their tunability in a broader range of electromagnetic spectrum finds applications in almost every field of science and technology wherein light–matter interactions are observed. Further, several efforts have been attempted by the nanotechnology research community to optimize the morphology of a plasmonic nanoparticle and its SPR resonance for various applications. On the other hand, several researchers have also been carried out to elucidate the thermo-optics phenomena of metallic nanoparticles for complex nanogeometries [23–28].

But little attention has been paid in the literature to theoretically explain the local heating mechanism in presence of plasmonic nanogeometries. In all such works, it was reported that the surface plasmon resonances