



## Brief CV: Dr. Manoj Kumar Panda

### **Office Address:**

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### **Personal Information:**

Date of Birth: 14-06-1978, Birth place: Daspalla, Nayagarh, Odisha, India.

### **Communication (Postal) Address :**

S/O: BINODA BIHARI PANDA; Village: HARIDABADI; Post: DASPALLA; District: NAYAGARH; State: ODISHA; Pin-752084; India

### **Awards & Fellowships:**

- Selected as NBHM (National Board For Higher Mathematics) Postdoctoral Fellow, 2011 (Department of Atomic Energy, Government of India).
- Qualified Graduate Aptitude Test in Engineering (GATE-2003) for pursuing Ph.D. in Mathematics (Department of Higher Education, Ministry of Human Resource Development (MHRD), Government of India)

### **Academic Qualifications:**

- Selected as UGC-Assistant Professor in Mathematical Sciences through **UGC-FRP (ID:FRP39356)**, 2015.
- NBHM Post-Doctoral Fellow: IISc Bangalore, India from 2011- 2013 [*Award No. 2/40(38)/2010-R&D-II/2238 dated 02/02/2011*].
- *Ph.D.* (Mathematics, 2011): Indian Institute of Technology, Kanpur. Thesis title: "Some Problems on Phototactic Bioconvection", Thesis supervisor: Prof. S. Ghorai, IIT Kanpur.
- *M.Sc.* (Mathematics, 2000): Utkal University, Odisha, India, First division (70.08%).

### **Previous Experiences:**

- **Assistant Professor in Mathematics:** IIITDM-Jabalpur, India (Sept. 2013-cont.)
- **Assistant Professor in Mathematics:** KIIT University, Odisha (April 2013-August 2013)

### **Research Interest:**

Mathematical Modelling, Numerical Methods, Bio-Fluid mechanics, Differential Equations

### **Research Projects:**

“Bioconvection in a suspension of isotropically or anisotropically scattering phototactic algae exposed to both diffuse and collimated solar radiation or diffuse solar radiation only” 10 lakhs through Institute research initiation grant, PDPM IITDM Jabalpur, India, 2014-15.

### **Selected Peer-reviewed Publications :**

- Bioconvection in a suspension of isotropically scattering phototactic algae. S. Ghorai, **M. K. Panda**, and N. A. Hill. **Phys. Fluids** **22**, (071901) 1–16, 2010 (American Institute of Physics, ISSN: 1070-6631, Impact Factor 2.04). <http://dx.doi.org/10.1063/1.3457163> (16 pages)
- Bioconvection in an anisotropic scattering suspension of phototactic algae. S. Ghorai and **M. K. Panda**. **European Journal of Mechanics–B/Fluids** **41**, 81-93, 2013 (ELSEVIER, ISSN: 0997-7546, Impact Factor 1.55) <http://dx.doi.org/10.1016/j.euromechflu.2012.07.001> (13 pages)
- Penetrative phototactic bioconvection in an isotropic scattering suspension, **M. K. Panda** and S. Ghorai. **Phys. Fluids** **25** (071902) 1-26, 2013 (AIP, ISSN: 1070-6631, Impact Factor 2.04) <http://dx.doi.org/10.1063/1.4813402> (26 pages). [*This Manuscript was published during the Postdoctoral research availed through NBHM Postdoctoral Fellowship at IISC Bangalore, India*; (Award No: 2/40(38)/2010-R&D-II/2238 dated 02/02/2011)]
- Effects of magnetic-field-dependent viscosity at onset of convection in magnetic nanofluids. M. Arora, R. singh & **M.K.Panda**. **Journal of Engineering mathematics** (97) 2016, ISSN: 1573-2703, Impact Factor 0.8, (<http://dx.doi.org/10.1007%2Fs10665-016-9855-9>) (17pages)
- Penetrative phototactic bioconvection in a two-dimensional non-scattering suspension, **M. K. Panda** & R. Singh. **Phys. Fluids** **28**(054105) 1-23, 2016 (American Institute of Physics, ISSN: 1070-6631, Impact Factor 2.04) (<http://dx.doi.org/10.1063/1.4948543>) (22 pages)
- Effects of both diffuse and collimated incident radiation on phototactic bioconvection, **M. K. Panda**, R. Singh, A. C. Mishra and S. K. Mohanty, **Physics of Fluids**, 28 (124104) 1-29, 2016 (American Institute of Physics, ISSN: 1070-6631, Impact Factor 2.04) (<http://dx.doi.org/10.1063/1.4972057>) (29 Pages)

### **Preprints/under review publications:**

- "Linear stability of gyrotactic plumes: rigid side wall," Applied Mathematics and computation, 2016 by R.Singh and **M. K. Panda** (Under review)

### **Invited/Contributed Talks:**

- “Onset of Phototactic Bioconvection in an Isotropic Scattering Suspension” at **TIFR-CENTRE FOR APPLICABLE MATHEMATICS**, BENGALURU, INDIA on 5th January-2015
- “Bioconvection in a planar layer of isotropically scattering phototactic algae exposed to both diffuse and non-diffuse (collimated) light intensity ” at **IIT KANPUR, INDIA**, in conference **ICMCB-2015**, 28th Feb.-3rd Mar. 2015

### **Conferences/Workshops attended:**

- National Symposium on Scientific Computing with Application to Partial Differential Equations, IIT Kanpur (India), Nov. 19-21, 2005.

- Indo-Australian workshop on CFD Approach on Fluid Flow, Heat and Mass Transfer and Symposium on CFD Applications in Multidisciplinary Areas, IIT Roorkee (India), April 12-14, 2007.

### Teaching Interest:

Real Analysis, Complex Analysis, Linear Algebra, Fluid Mechanics, Numerical Analysis, Differential Equations,

### Academic Experience:

Teaching Assistant, MTH 203N, Ordinary and Partial Differential Equations (B.Tech. Core Course, IIT Kanpur, India, 2007-2008, Odd Semester & 2008-2009, Odd Semester).

### Computer Skills:

Fortran, C, C++, LATEX, Linux, Windows, Matlab.

### Brief Description of Research Work Done:

I work on bioconvection (collective motion of swimming micro-organisms like algae and bacteria etc.) in a suspension of phototactic micro-organisms. Bioconvection is defined as the subject of convection induced by swimming micro-organisms which are slightly denser than the medium they swim in. The bioconvection equations, based on the continuum approximation, consist of the Navier–Stokes equations for an incompressible fluid coupled with a micro-organism conservation equation. The features common to all bioconvection patterns are that the micro-organisms on average swim upwards, although swimming techniques vary considerably across species. Since the mean swimming direction is usually upwards, it leads to the formation of a dense layer at the top of the suspension. When the parameters (e.g. the Rayleigh number) are above critical values, this leads to a convective instability and formation of convection patterns. This phenomenon has some similarity with the Rayleigh Bénard convection, but is driven solely by the swimming of the micro-organisms.

### References:

Prof. S. Ghorai Department of Mathematics and Statistics, Indian Institute of Technology, Kanpur Kanpur-208016, India Tel: 91-512-259-7461(o) Fax: 91-512-259-7500 Email: <a href="mailto:sghorai@iitk.ac.in">sghorai@iitk.ac.in</a>	Prof. B.V. Rathish Kumar Department of Mathematics and Statistics, Indian Institute of Technology, Kanpur Kanpur-208016, India Tel: 91-512-259-7660(o) Fax: 91-512-259-7500 Email: <a href="mailto:bvrk@iitk.ac.in">bvrk@iitk.ac.in</a>	Prof. PVS Murthy Department of Mathematics, IIT Kharagpur Kharagpur-721302, India Tel: 91-322-228-3646(o) Fax: 91-322-225-5303 Email: <a href="mailto:pvsnm@maths.iitkgp.ernet.in">pvsnm@maths.iitkgp.ernet.in</a>
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