September 3, 2015

Prof. Detlef Lohse,
Editor, Journal of Fluid Mechanics,
Cambridge University Press,
Cambridge CB2 8RU UK

Dear Prof. Lohse,

Please consider a manuscript entitled, "Linear stability analysis for *monami* in a submerged sea grass bed" by Ravi Singh, Mahesh Bandi, Amala Mahadevan, and myself for publication in Journal of Fluid Mechanics. This manuscript addresses the synchronous coherent oscillations of aquatic vegetation in a steady flow, known as *monami*. The phenomenon is analogous to the more commonly observed synchronous waving of terrestrial grasses in the wind. In the manuscript, we present a mathematical model for the onset of these oscillations using linear stability analysis. Our manuscript is 10 pages long, therefore we wish to be considered under the *Rapids* section of the journal.

Our work examines the instability at the interface of a submerged grass bed and overlying fluid in the presence of a unidirectional flow. The impedance of the flow by the grass sets up a shear layer above the grass. It has been previously postulated from experiments that this shear layer is susceptible to Kelvin-Helmholtz instability, which drives the waving of the grass. However, a careful treatment of this instability is missing in the literature. Here, we provide such a treatment, and show that the presence of drag due to the grass also generates an instability mechanism, in addition to and distinct from a modified Kelvin-Helmholtz instability.

Coherent motion of seagrass meadows enhances the transport of nutrients, gametes, larvae, and other microscopic life forms within the habitat they form. This transport in turn influences the seagrass ecosystem and regulates the biomass in it. Although seagrasses occupy less than 0.05% of the ocean area, they contribute directly to about 15% of the total biomass production rate in the ocean, provide habitat to thousands of other species, sequester carbon, recycle nutrients, and stabilize sediments. Due to their effectiveness in performing these functions, seagrasses are considered some of the world's most valuable resources. An improved understanding of the processes performed very effectively by the seagrasses is critical in managing the planet's seagrass meadows. The synchronous motion of the meadow is one such process allowing the submerged seagrass meadow to exchange matter with the overlying fluid. Our manuscript is one of the few theoretical treatments on the physical mechanism behind these oscillations. We believe that the topic will be of interest because of its pertinence to the commonplace terrestrial analogy and the importance of the seagrass ecosystems. We have endeavored to write it in a form that is accessible to the general physicist.

Should you have any questions, please do not hesitate to contact me.

Thanking you,
Yours Sincerely,

Shreyas Mandre
Assistant Professor
School of Engineering, Brown
University