

Abstract Submitted
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Stability theory for the synchronized waving of marine grass RAVI SINGH, SHREYAS MANDRE, Brown University, AMALA MAHADEVAN, Woods Hole Oceanographic Institution, L. MAHADEVAN, Harvard, MAHESH BANDI, Okinawa Institute of Science and Technology - Japan — Synchronized waving of grass blades in the presence of fluid flow has been observed in cases such as wheat field in wind, marine grass in tidal currents. The synchronous motion can have important environmental and ecological impact via mixing of fluid due to waving. When the hydrodynamic and elastic time scales are well separated, this waving is the manifestation of a shear instability. We extend the Orr-Sommerfeld equation for the stability of a shear flow to include a continuum mean-field approximation for the vegetation, thus capturing the essential ingredients for waving. Our model exhibits an hydrodynamic instability due to different amounts of drag experienced by fluid with in and above the grass. We will also present some numerical results exhibiting existence of a threshold flow speed for waving, which have been observed in case of submerged marine vegetation

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