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The Mixing Layer Instability of Wind Over a Flexible Crop Canopy

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Wind flow over vegetal canopies is characterized by large scale coherent stuctures propagating over the crop surface. Those structures result from an instability mechanism similar to a mixing layer. It leads to oscillatory wind induced plant motions. A coupled fluid-stucture model is proposed to study the dynamics of a flexible crop canopy exposed to wind. The canopy is represented by an elastic continuous medium and coupled to the wind mixing layer through a drag load. The mixing layer instability is shown to remain the principle instability mechanism but its characteristics are modified when taking into account the flexible canopy. The size of the coherent structures is decreased as well as the instability growth rate.

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