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Flow structure in self-sustaining and intermittently turbulent reciprocating channel flow ALIREZA EBADI, CHRISTOPHER WHITE, University of New Hampshire, YVES DUBIEF, University of Vermont, UVM TEAM, UNH TEAM — The leading order terms in the Reynolds-averaged momentum equation are studied to better understand the underlying mechanism of transition to turbulence in reciprocating channel flow. The balance of the leading order terms confirms that fully-developed turbulence first emerges at the early phases in the decelerating portion of the cycle. The underlying mechanism of this transition appears to be the emergence of an internal layer that first develops during the late phases of the accelerating portion of the cycle. In the absence of this internal layer, the flow remains transitional over the entire cycle. The turbulent structure associated with the internal layer is investigated using different flow structure identification schemes. In particular, the Q-R criteria and the triple decomposition of the strain rate tensor.

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