

Abstract Submitted
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Period doubling during Liebau pumping in the displacement mode DAVID AUERBACH, Medical University Graz, MAXIMILIAN MOSER, Joanneum Research, Weiz, Austria — Liebau Pumping is the often strong unidirectional flow obtained when a more or less elastic tube containing a fluid is periodically squeezed. It is a ubiquitous non-peristaltic feature in many interactions between tubes and fluids contained in them, and has been invoked to explain numerous biological flows. These include promoting blood flow in early vertebrate embryos, in animals with valveless hearts and lymph flow in the eye. It has also been discussed in connection with power-optimization of blood flow. One of the most popular setups is the circular geometry with two in-series interconnected pipes joined at their ends. This system has a zero head: All power is used to bring the fluid into flow, the flow mode. A beaten U-tube, on the other hand, has no steady flow component, what I call the pressure mode. A partially filled horizontally oriented tube allows the fluid displacement for each beat to be measured. This mode is what I call the displacement mode. A period doubling is the most ubiquitous feature of operation in this mode. Even single beats without any wave interaction between beats gives rise to this behaviour.

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