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Dependence of the flow structure inside the long pipe from the two types of swirling at the entrance.

Abstract: A swirled air flow in the long pipe is under consideration, two types of swirling at the entrance of pipe being fixed. The first type corresponds to the law of forced vortex motion. The second uses a zigzag-like motion. Numerical solutions of corresponding equations describing flows through the pipe were compared for these two types of swirling. It was found that both structures of "vortex breakdown" are similar and consist of the similar types of swirling structures. The swirl angles were changed from $10°$ to $87°$. For all solutions similar conditions were retained. Godunov's method was used for investigation.

Keywords: air flow, vortex breakdown, swirling angle, structure, solid state swirling law, forced vortex motion, zigzag-like motion, long pipe, Godunov's method.