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Analysis of a steady laminar stagnation flow and its self-similarity properties GIANFRANCO SCRIBANO, FABRIZIO BISETTI, King Abdullah University of Science and Technology — The velocity field in a steady laminar stagnation flow is analyzed experimentally and numerically. The flow configuration is characterized by a stagnation plane formed between two streams flowing from opposite directions. This configuration is used in the study of flames and condensing aerosols. The flow is characterized geometrically by the nozzle diameter D and the separation H between the nozzles. Together with the bulk velocity U, the separation H is used to define the Reynolds number. Particle Image Velocimetry is used to measure the velocity field and simulations are conducted to further characterize the flow. For this analysis, we explore values of H/D equal to 0.5, 1, 1.5, and 2, and values of the Reynolds number equal to 300, 600, 900, and 1200. The analysis is repeated for four nozzles having identical shape and diameters D equal to 7.5, 15, 30, and 35 mm. Our results show that the non-dimensional velocity fields are parametrized well by Re and H/D for all the diameters and that the simulations agree with the PIV data very well. The non-dimensional fields depend mostly on H/D, while the influence of Re is negligible for Re $>$ 300, in accordance with theoretical results. The parameter H/D plays an important role in influencing the flow inside and outside the nozzle.

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