# HYDROGEN GENERATION THROUGH CAVITATION-BASED WATER SPLITTING

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Currently, hydrogen is considered a green alternative to fossil fuels, and numerous efforts are being made to develop sustainable processes for its production. Water hydrodynamic cavitation, which consists of pressure variations in a water stream flowing through a constriction, such as an orifice or a venturi, is one of them. This phenomenon leads to the growth and collapse of microbubbles, or cavities, which generate high local temperatures and pressures, creating optimal conditions for hydrogen generation through water splitting. Our research work is aimed at modelling and testing cavitation-based hydrogen generation; for this purpose, orifice cavitation simulations were carried out. As an initial step of our study, a series of simulations was conducted using Ansys Fluent 2025 to investigate a cavitation orifice reactor (Figure 1). The computational analysis was conducted on a pipe with a diameter of 30 mm and an orifice diameter of 2 mm. Simulations were carried out at a constant inlet pressure of 700 kPag. The effect of varying the orifice length (l) was analysed, revealing that the vapour region expands as the orifice length increases. For instance, at l = 2 mm, a substantial vapour region was observed, as illustrated in Figure 2. These preliminary findings suggest that the conditions are favourable for green hydrogen production.

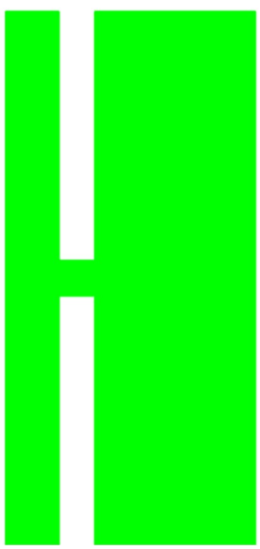

**Figure 1.** Mesh depiction with number of elements: 404,422.

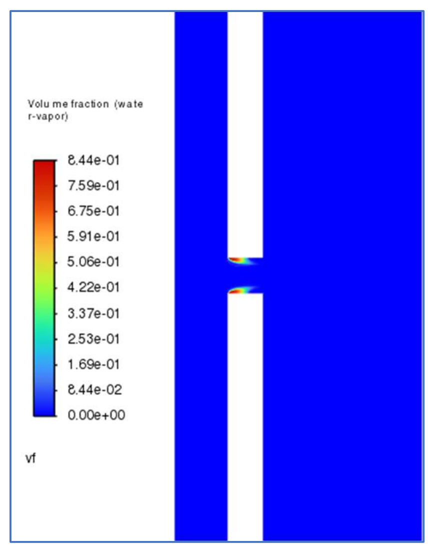


**Figure 2.** Vapour fraction contour with l = 2 mm.

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