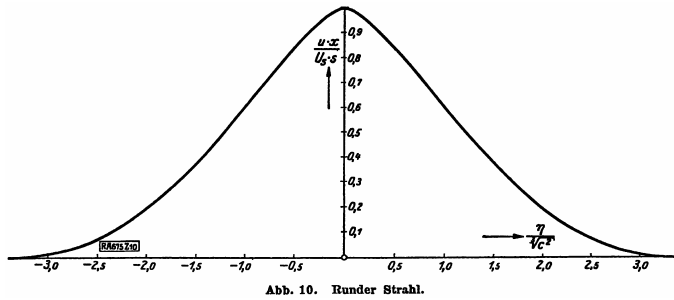


Basic contributing elements



One of the first was Tollmien¹⁹. Using the Prandtl theories he calculated the velocity profile, Figure 6.5, of a round turbulent jet. A curve resembling the standard distribution was found.

Figure 6.5 Velocity profile of a round jet according to Tollmien¹⁹

Reichardt followed in 1941²⁰ and 1942/49²¹. He was the first to note²² that the measured velocity profiles of jets bore a great similarity to the Gaussian error curve, especially for the larger values. For the lower values at the coordinates near the borders of the distribution a larger deviation was found. As all of these publications showed calculated velocity profiles, it must have been a hot topic among these insiders.

Squire²³ wrote a British contribution. He distanced himself from the physical explanations of the Prandtl school of thought and applied dimensional analysis.

Prandtl discussed the problem in his books²⁴ and it remained a subject in the revised reprints. Szablewski²⁵ was another contributor. He calculated the effects of the turbulent mixing of two flat jets of approximately equal velocities, but with very different temperatures. He concluded that the boundary of the mixing zone turned towards the hotter jet. The investigation itself may not have been relevant to round jets in stagnant smokegas, but temperature differences changed over the years with the increasing levels of superheat used.

Wuest²⁶ tested the combination of a round jet and a catching tube (chimney). He used a submerged orifice from which a jet of water was directed into a catching tube, Figure 6.6.

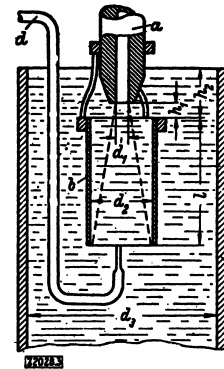
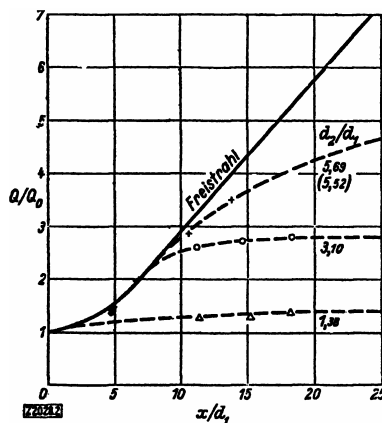


Figure 6.6 Experimental setup²⁶



Wuest showed that the ratio of the total amount of fluid ejected from the tube Q to the exhausted fluid Q_0 had a limiting value that was related to the ratio of the catching tube d_2 to that of the diameter d_1 of the exhaust orifice, Figure 6.7.

Figure 6.7 Ratio of Q to Q_0 ²⁶

The orifice diameter d_1 was 5.8 mm, the catching tubes varied from 8 to 33 mm diameter and had lengths varying from 60 to 100 mm. Table 6.1 shows the results: