

## **BLAST WAVE PROPAGATION IN TUNNELS WITH CROSS SECTIONAL AREA CHANGES**

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For a number of years, the NC Laboratory Spiez has been performing systematically shock tube investigations of the blast wave propagating in tunnel and tunnel systems with small scale models.

After a preliminary end of the investigations concerning tunnel bent, branched and cross-branched configurations (presented in MABS 6, 7 and 8), the data for cross-sectional area changes will be treated in this paper.

The main purpose of this test series was to get a better insight and more data for the pressure decay or increase after the area changes and to determine the influence of the transitional angle respectively. Moreover, the experimental results should also be the basis for further theoretical work and for comparisons with already known analysis.

The ratios of the cross-sectional area changes tested were 2, 5, 10, 20 and 40, whereas the transitional lay between 10 and 90 degree. The shock strength varied from 2 to 10 for the enlargement case and from 2 to 6 for the reduction one.

All tests of which the results are presented herein were carried out on a shock tube producing a so-called step-shock wave. Furthermore, a comparison of these results to those obtained with "real" blast profiles for a particular area change will be given.

In addition to the pressure measurements a flow field analysis with shadowgraph techniques and with hydraulic analogy using a water table has been performed. The results of these different methods are compared.

All results will be incorporated an a new edition of the Swiss Handbook for the Design of Protective Structures.