

**ANEMOMETRIC MEASUREMENTS IN
THE AIR JET COMING FROM A
PNEUMATIC SPRAY PAINTING GUN**

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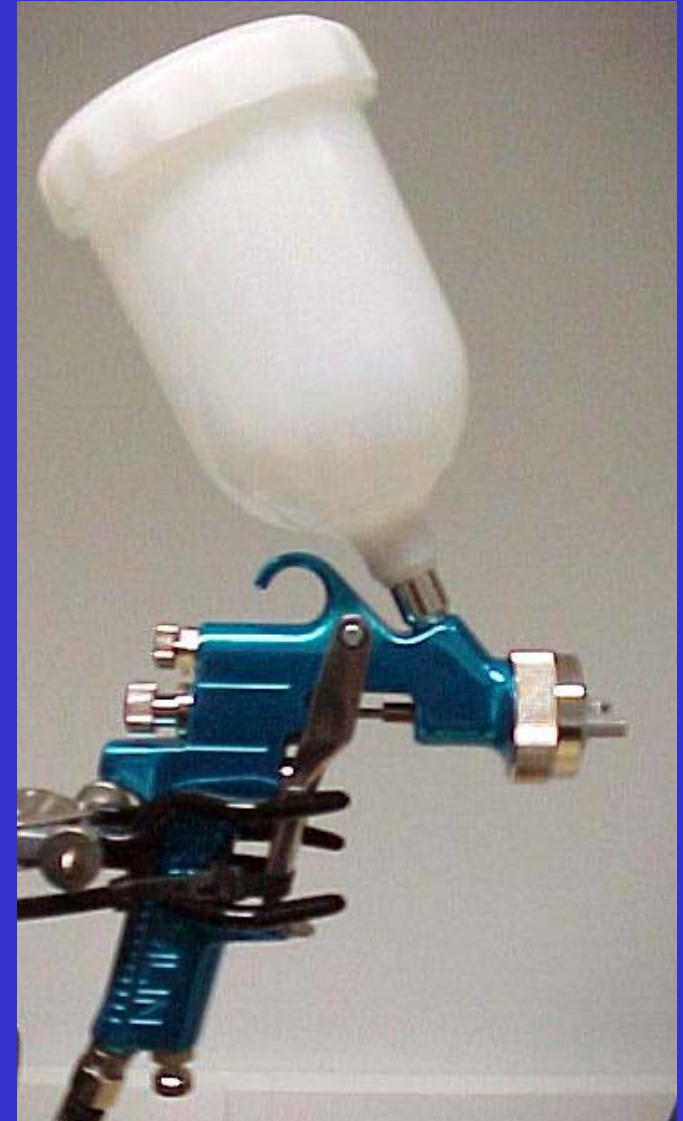
INTRODUCTION

- During spray painting operations, the initial emission of pollutants occurs inside an air jet coming from the head of the paint gun
- The aim of this study was to measure the characteristics of this type of jet :
 - intensities of the air velocities
 - dimensions of the jet
 - aspect ratio of the jet

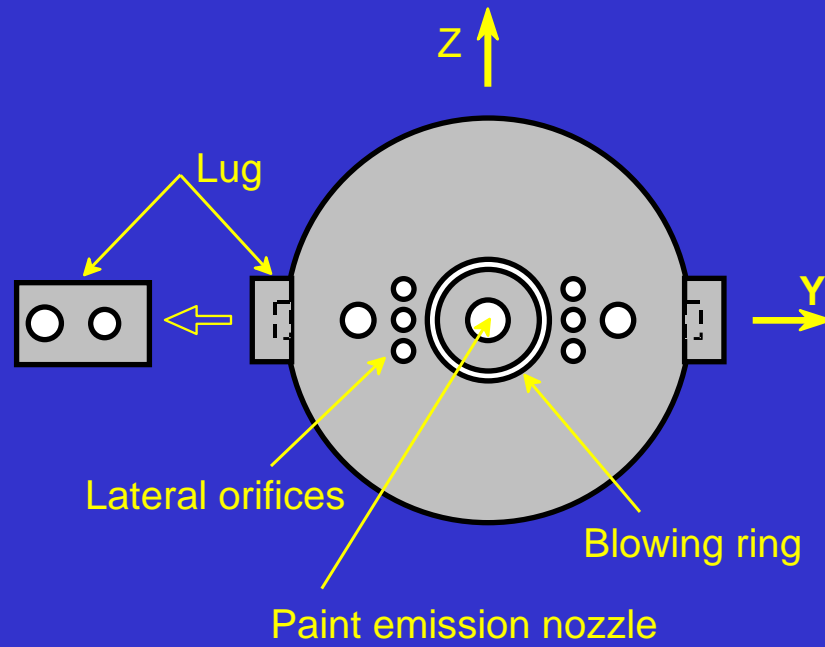
in order to improve the modelling of the pollutant sources

METHODS

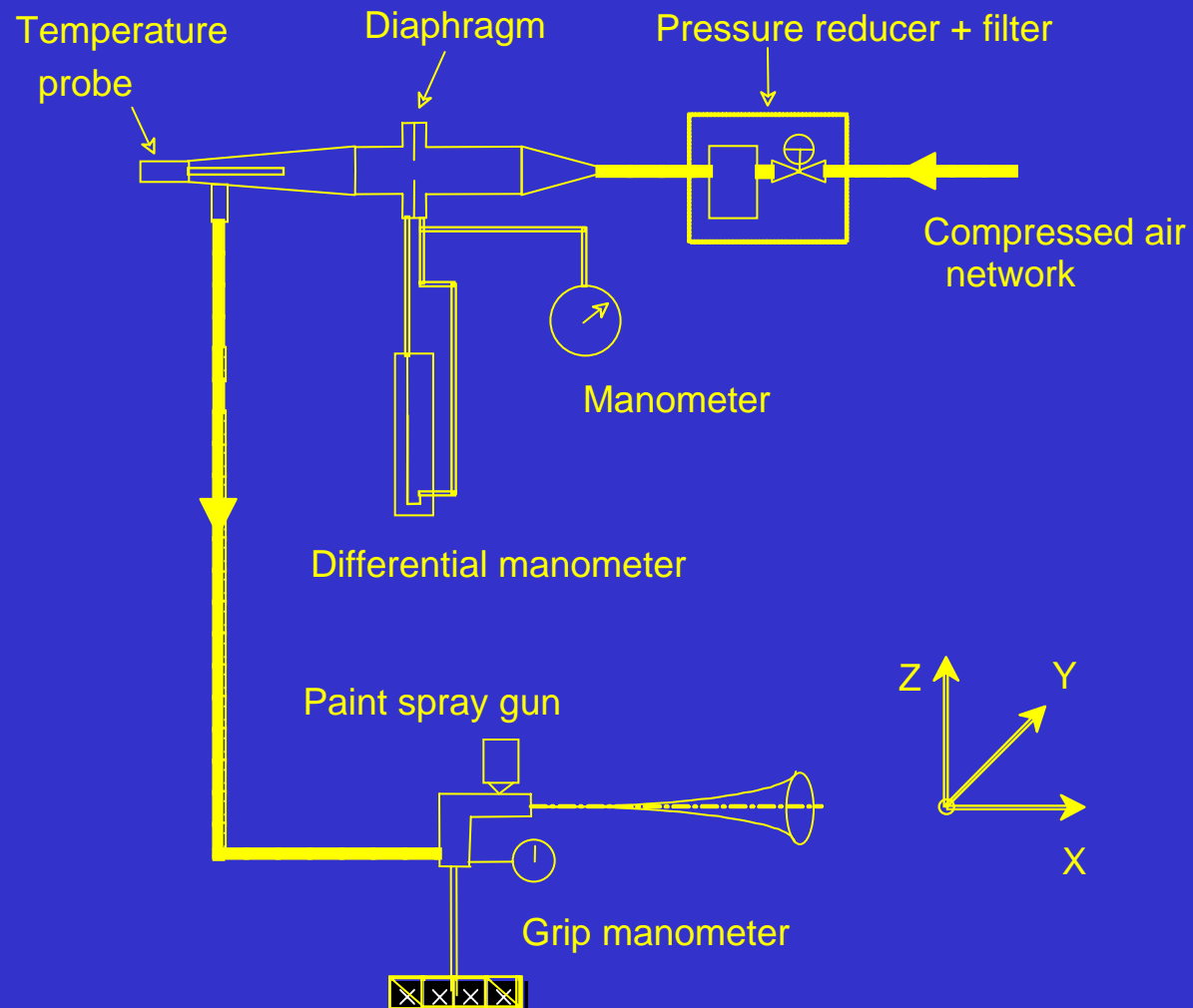
- Anemometric measurements were made, in the absence of paint, using a very-fine Pitot static tube in front of a pneumatic gun set to operate with a flat jet
- The relative pressure at the handle was 4.5 bars and the consumed airflow rate 17.5 m³/h
- The air velocities were measured along the axis of the jet as well as in three planes orthogonal to this axis



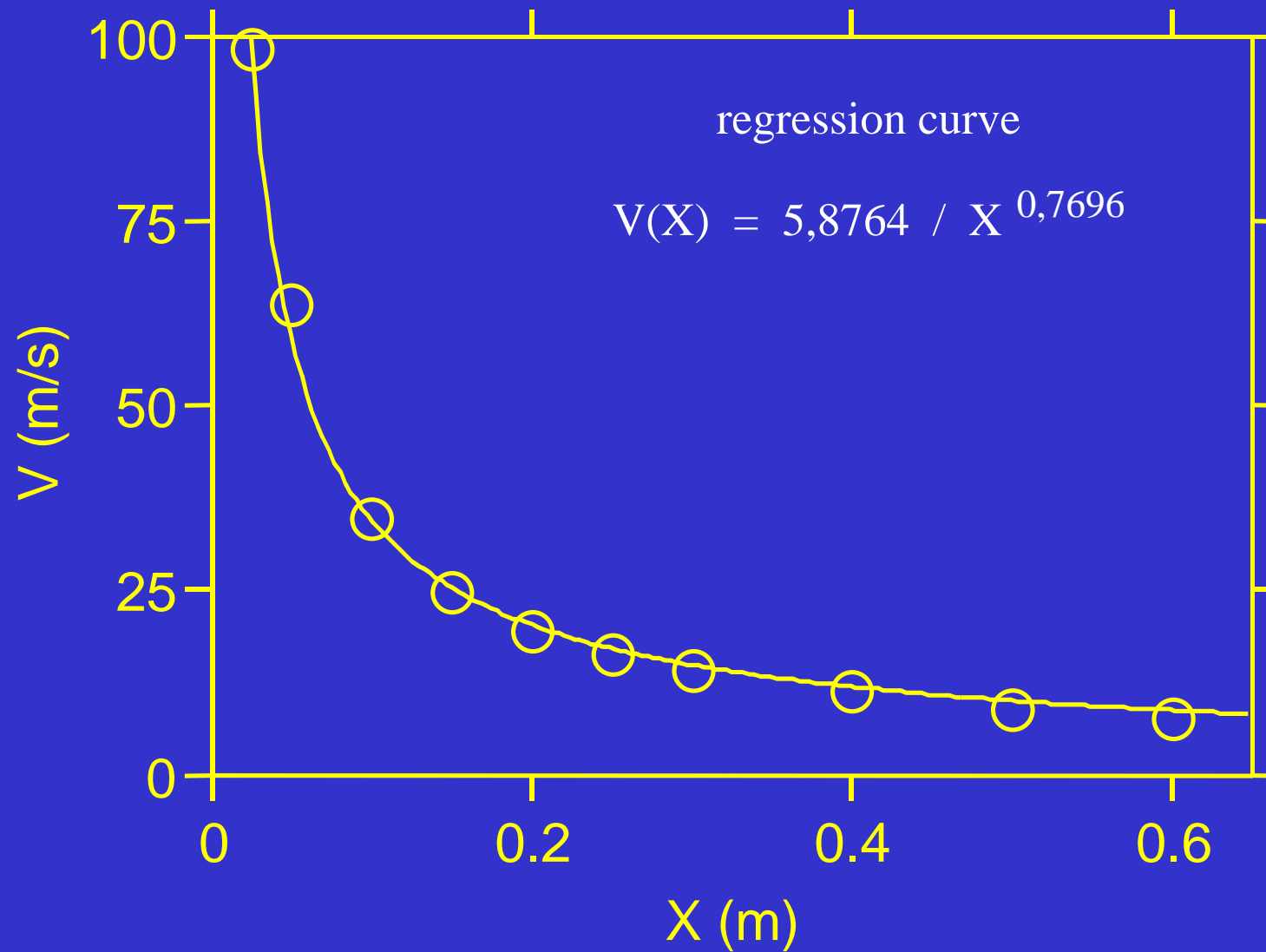
PAINT SPRAY GUN HEAD



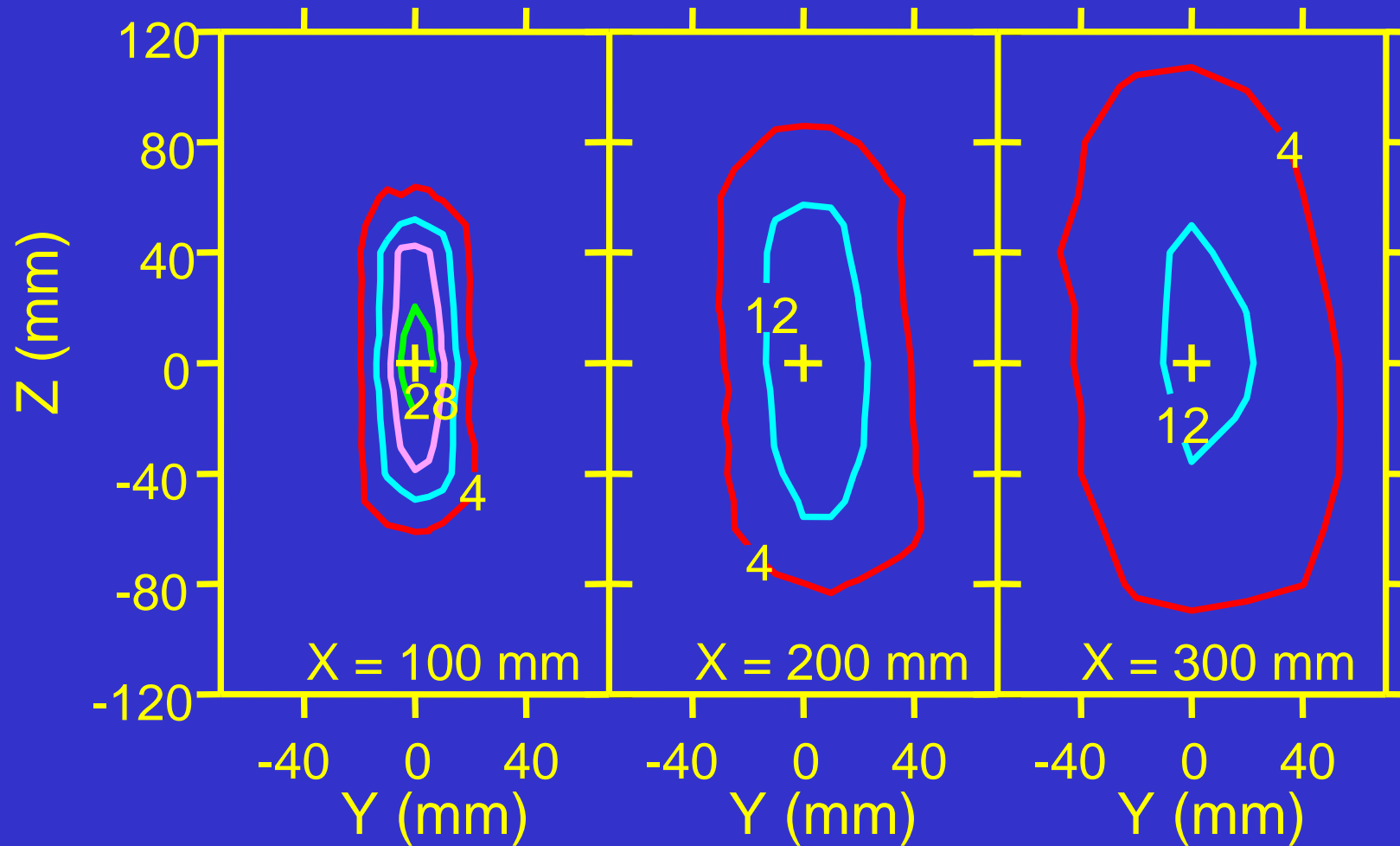
DIAGRAMMATIC REPRESENTATION OF EXPERIMENTAL APPARATUS



AIR VELOCITIES MEASURED ALONG JET AXIS

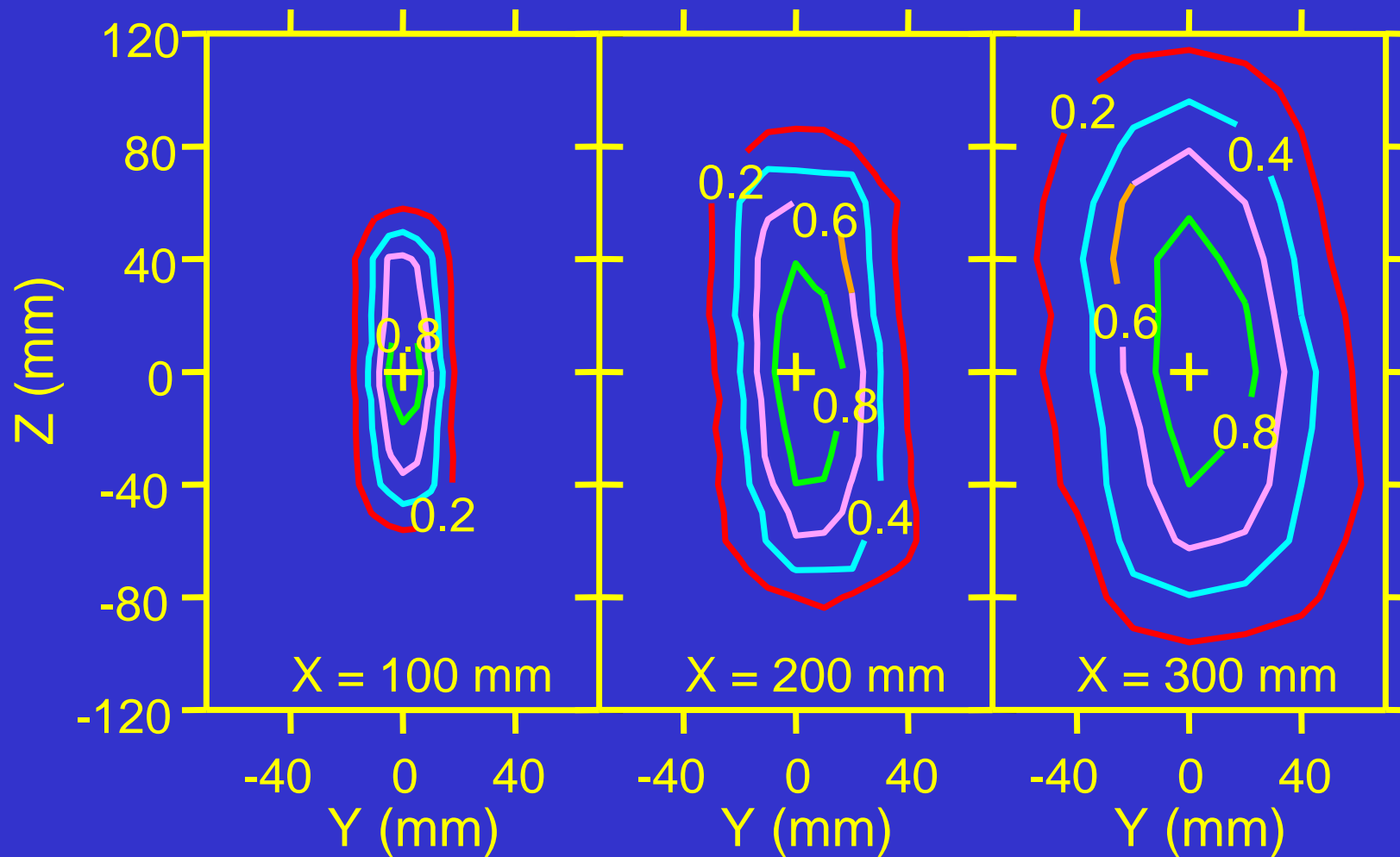


CONTOURS OF EQUAL VELOCITY COMPONENT U IN THREE PLANES ORTHOGONAL TO JET AXIS



CONTOURS OF EQUAL VELOCITY COMPONENT U

Velocities are expressed as fractions of the local axial velocity



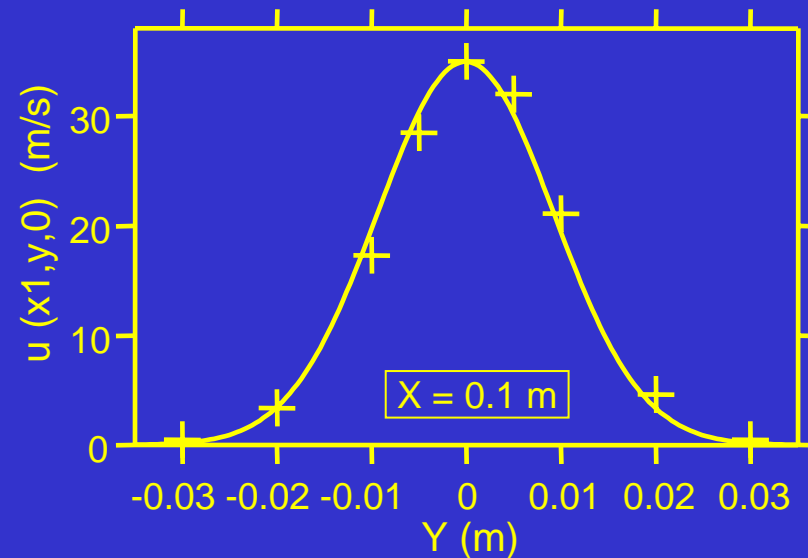
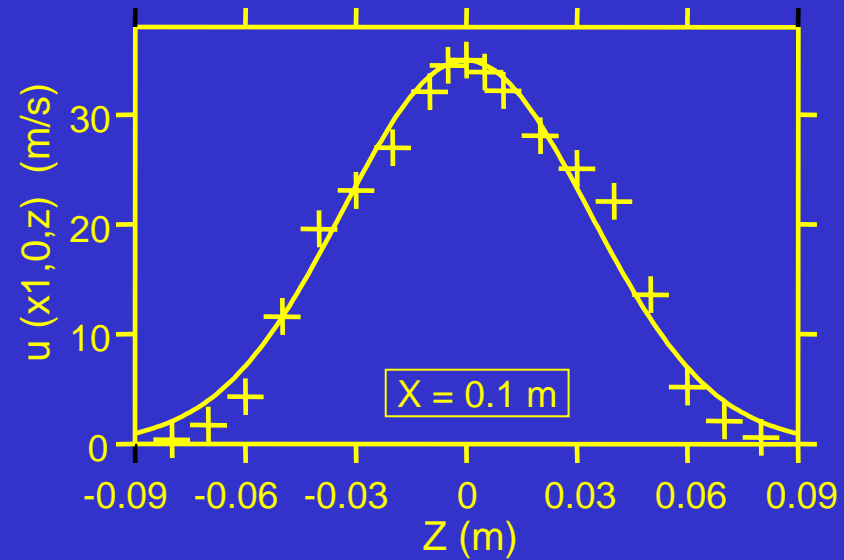
ORTHOGONAL PLANE TO JET AXIS

LATERAL PROFILES OF
VELOCITY

measures (+)

and regression curves

$X_1 = 0.1 \text{ m}$



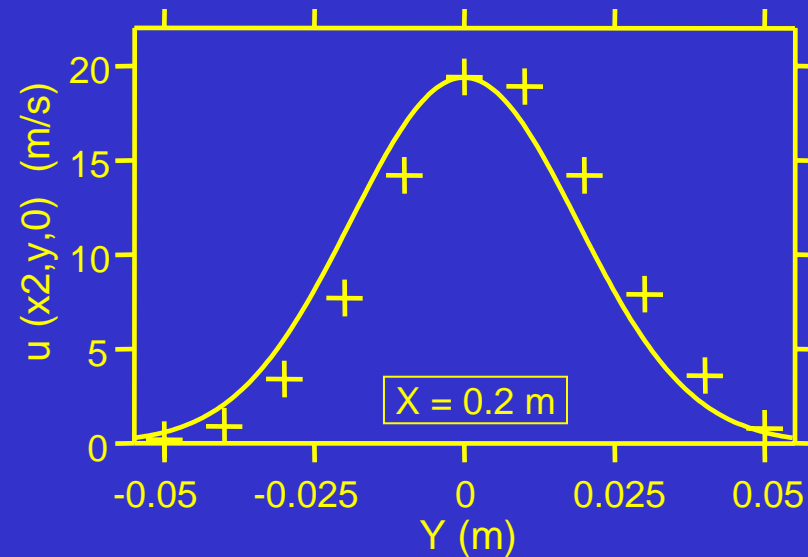
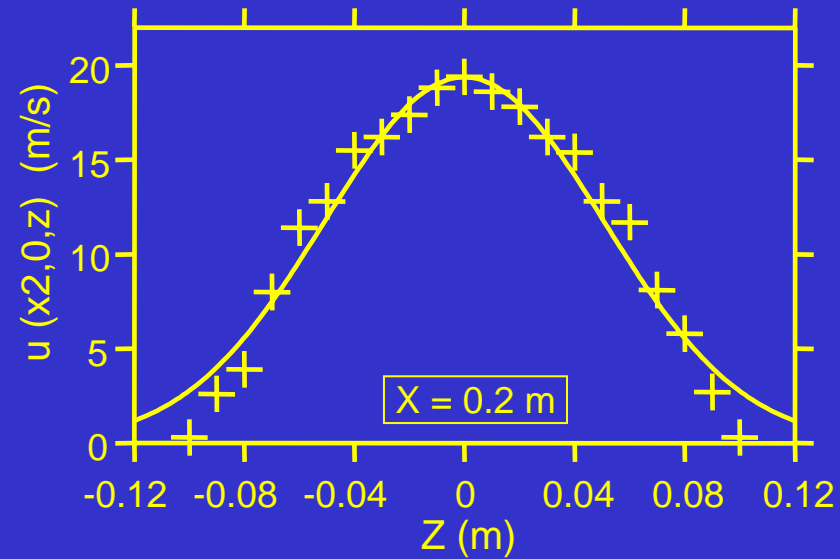
ORTHOGONAL PLANE TO JET AXIS

LATERAL PROFILES OF VELOCITY

measures (+)

and regression curves

$X_2 = 0.2 \text{ m}$



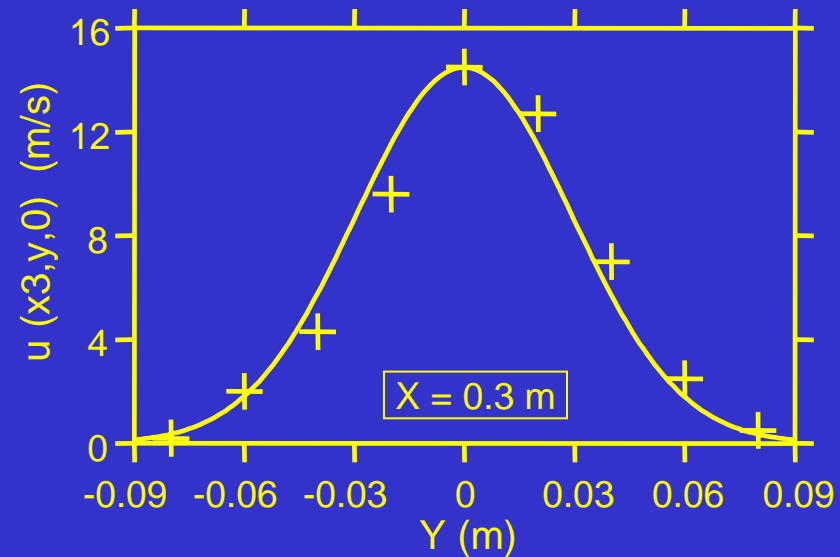
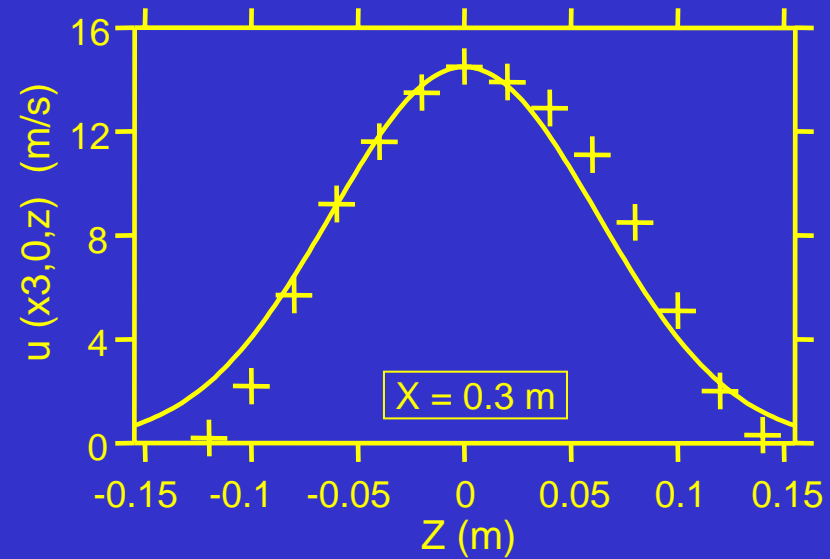
ORTHOGONAL PLANE TO JET AXIS

LATERAL PROFILES OF
VELOCITY

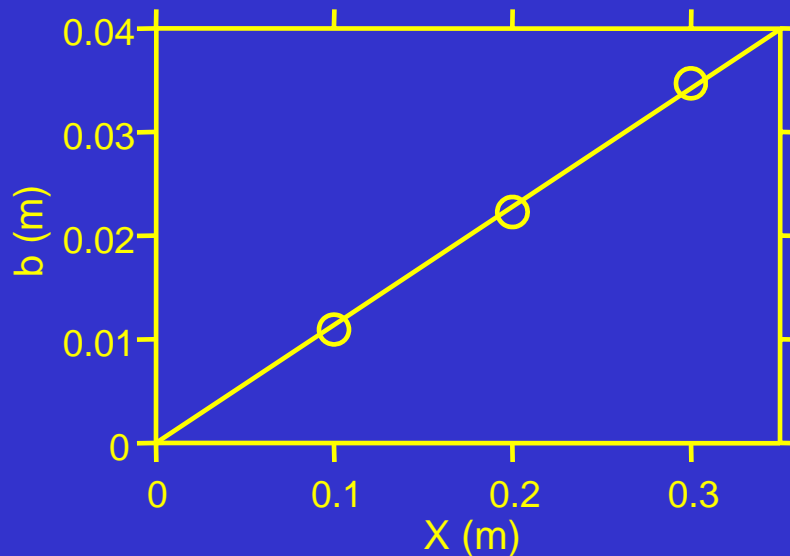
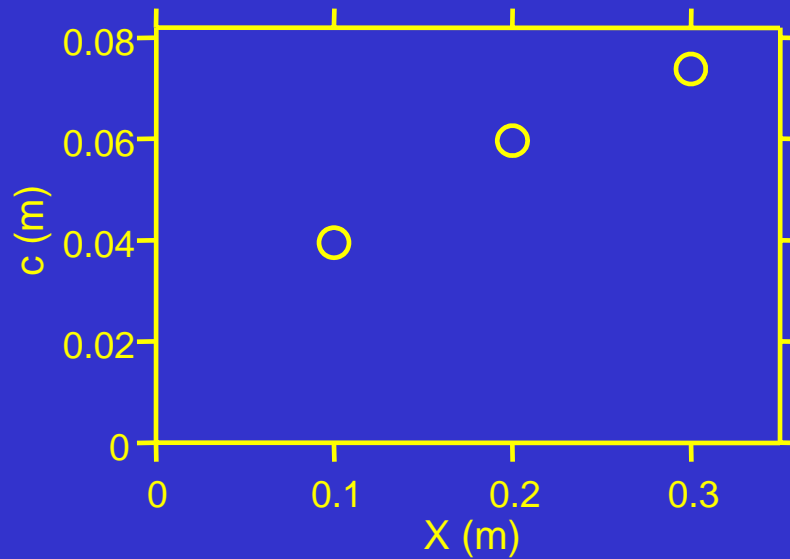
measures (+)

and regression curves

$X_3 = 0.3 \text{ m}$

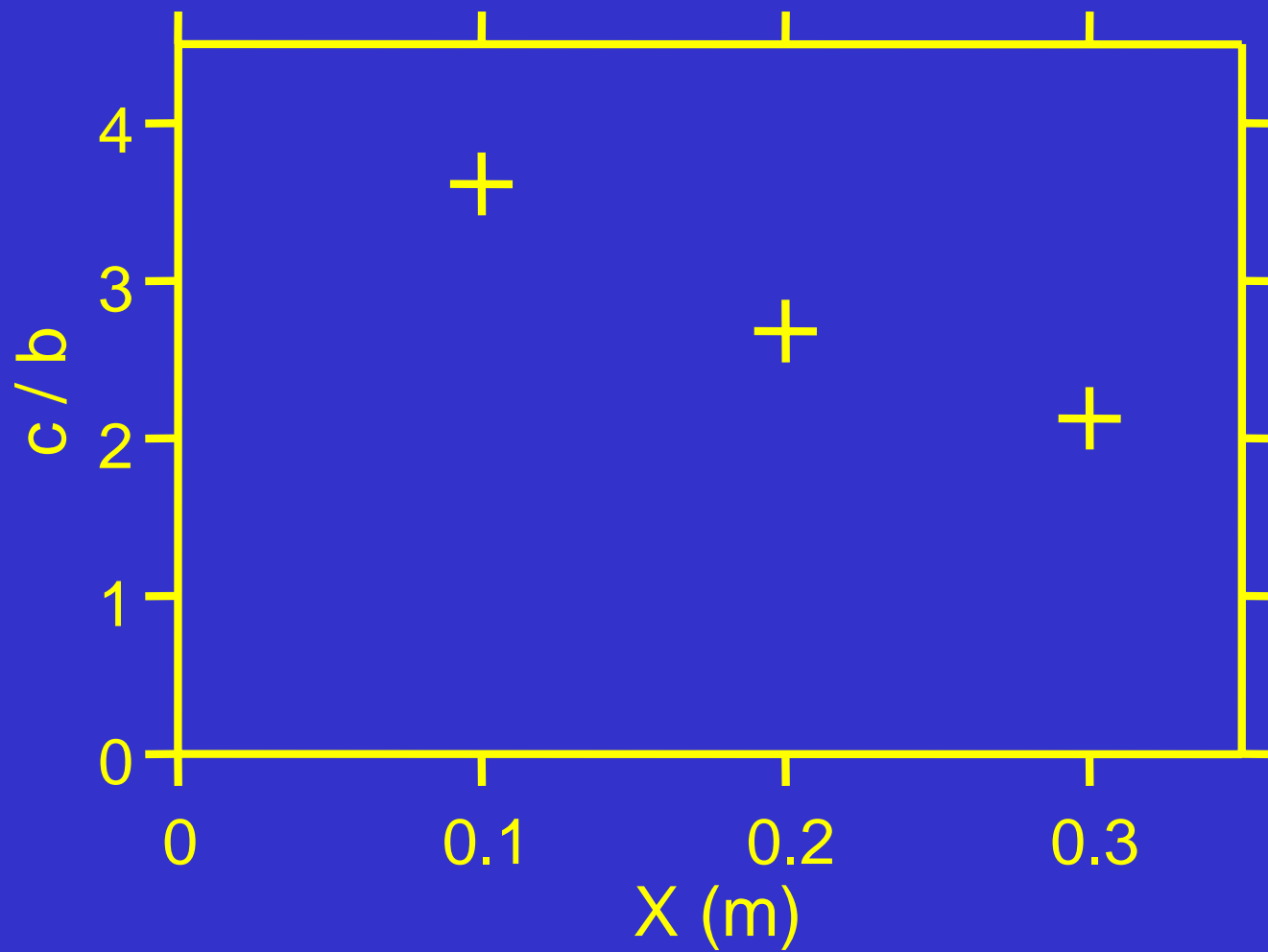


JET HALF-RADII FOR THREE DISTANCES TO SPRAY GUN



$$b = 0.114 X$$

AIR JET ASPECT RATIO FOR THREE DISTANCES TO SPRAY GUN



CONCLUSIONS

- The air jet emitted by the spray gun, when operating with a flat jet, was characterized by anemometric measurements to get
 - axial air velocity values
 - jet shape and dimensions.
- Airflow details of course remain dependent on parameters such as
 - consumed air flow rate,
 - vent air adjustment
 - characteristics of the spraying head and the spray gun.