# WT CORRECTIONS APPLIED IN S1MA

## Empty test section corrections

**These corrections result from wind tunnel calibration. They consist of:**

**- a Mach number correction, corresponding to the Mach number deviation between the wind tunnel reference pressure taps and the abscissa of the reference point of the model measured during the test section calibration.**

**- a drag correction due to the buoyancy induced on the model by the static pressure gradient measured during the test section calibration.**

**- an incidence correction due to test section upwash, derived from lift measurements on the model in upright and inverted positions.**

## Wall and sting effects

**These effects are induced by the presence of the test section wall and the sting line around the model.**

**- Analytical method:**
**Corrections in Mach, incidence, drag coefficient and moment coefficient are calculated by an analytical method (DXV877 software). A mathematical description of the flow around the model and its sting is obtained by means of some hundred singularities (sources, doublets, horse shoe vortices).**
**Moreover, the effect of the model on the wind tunnel reference pressure tap is evaluated. These corrections are usually calculated for ten Mach number values and at 2 incidence values by Mach number. They comprise two terms, one constant and the other proportional to the lift coefficient.**
**The wall effect is the effect of the infinite series of the "images" of each singularity induced by the four test section walls; at highest Mach numbers (M > 0.85), corrections in Mach number are enlarged further to the comparison of calculated and measured "signatures" on the test section walls.**
**The sting effect is the direct effect of the singularities describing the sting and only corrections DM and $D\alpha$ at the wing are assessed.**

**- Experimental method:**
**The sting effect might be evaluated from the difference between rear part measurements in the presence or not of the dummy sting obtained during a specific test campaign with the model supported by the twin sting rig. Corrections of aerodynamic coefficients on the model rear part are assessed.**

**- CFD RANS computation:**
**The sting effect can preferably be calculated by CFD RANS computations. Calculations with and without sting are performed and the sting effect is extracted. Corrections of aerodynamic coefficients on the entire model are assessed.**

## Base pressure correction

**The base pressure correction results from the presence of a pressure coefficient different of zero inside the rear fuselage which is "open" to enable the sting entry.**
**It consists in replacing, on the surface SK, the mean measured cavity pressure PK by the reference pressure P0C. Corrections on drag coefficient, lift coefficient and moment coefficient are calculated.**

## Friction drag correction

**S1MA being an atmospheric wind tunnel, for a given Mach number, the temperature TI0 and the pressure PI0 are not constant during the test campaign. The friction drag correction reduces the drag coefficients to those which would be measured at a Reynolds number corresponding to TI0 = 323 K and PI0 = 89000 Pa.**