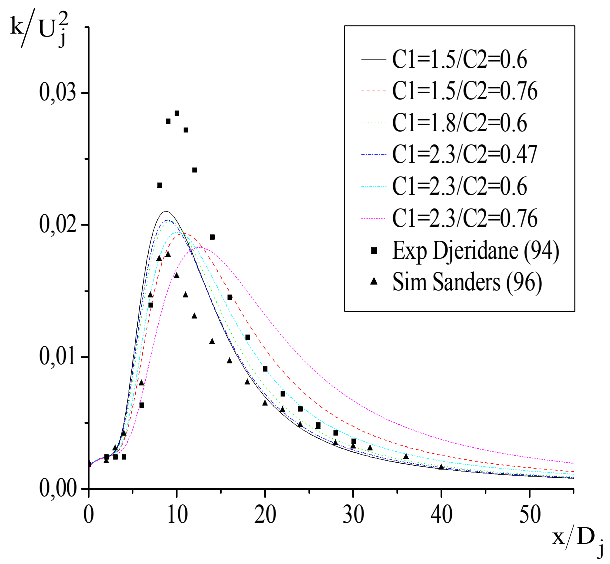

Fig. 6: Evolution of turbulent kinetic energy on the jet axis.

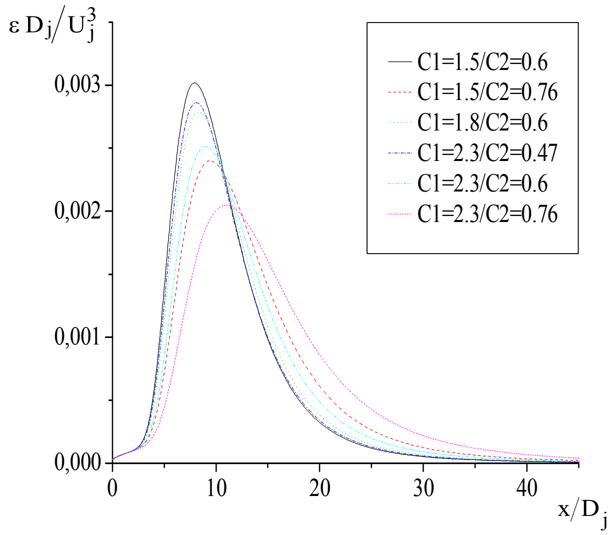

Fig. 7: Evolution of dissipation rate of the turbulent kinetic on the jet axis.

5. Conclusion

The principal objective of this work developed in this present paper is to test the performance of the constants pair (C_1, C_2), used in the modelling of the pressure-strain correlation term proposed by Launder, Reece and Rodi (1975) [1]. We analyzed the effect of the choice of this pair on the dynamic field development of a confined axisymmetric turbulent jet by using the RSM model. The study is performed, for turbulent jets by maintaining constant the exit velocity. Thus, on the basis of obtained result, we can draw the following conclusions:

- The initial development of the dynamic field of an axisymmetric turbulent jet is very influenced by the choice of the constants pair (C_1, C_2).
- This influence starts at a distance very near to nozzle exit (X/Dj≈3), in the core region (X/Dj ≤ 5) and becomes increasingly important away from the nozzle exit.
- Both profile relating to the two pairs (C_1 = 1.8, C_2 = 0.6) and (C_1 = 2.3, C_2 = 0.43) are almost the same.
- Both profile relating to the two pairs (C_1 = 1.5, C_2 = 0.76) and (C_1 = 2.3, C_2 = 0.6) reproduced better the experimental profile in the regions very close to the nozzle exit (X/Dj ≤ 8). In the far regions (X/Dj ≥ 20), the best prediction, is given by the three pairs (C_1 = 1.5, C_2 = 0.6), (C_1 = 1.8, C_2 = 0.6) and (C_1 = 2.3, C_2 = 0.47). Between these two regions, the experimental results are over-predicted by the numerical simulation. The intensity of this over-prediction depends on the chosen pair. In general, we can say that the two pairs (C_1 = 2.3, C_2 = 0.6) and (C_1 = 2.3, C_2 = 0.47) can be considered as an intermediate solution between the six pairs used.
- Numerical simulation results predicted better, in general, the experimental results compared to those of Sanders [5].
- Finally, we can say that the difference which exists between the results obtained by the RSM model, using the different constants pairs, and

those obtained by the Djeridane experiment (1994) [11] could result from different effects, present in the ejection section or within the tube. The modelling used in this present study is also a factor to taken into account.

Nomenclature

a_{ij} : Anisotropy tenseur

C_1 : Constant of return to isotropy

C_2 : Constant in the IP model

D_{ij} : Turbulent diffusion of Reynolds stresses

D_ε : Turbulente diffusion of dissiption rate

D_j : Diameter of nozzle exit

k :Turbulent kinetic energy

P, p : Instantaneous Pressure and its fluctuation

P_{ij} : Production of R_{ij} due to mean strain

R_{ij} : Reynolds stresses

R_{ej} : Reynolds number of the jet ($R_{ej} = \frac{U_j D_j}{\upsilon_j}$)

r : Radial distance

R_d : Density ratio ($R_d = \rho_j / \rho_a$)

u_i : Component i of the Reynolds fluctuations of U_i

U, V : Instantaneous axial and radial velocity

x : Axial distance

ε : Dissipation rate of turbulent kinetic energy

Φ : Generalized variable

ν : Kinematic viscosity

ρ : Density

— : Reynolds average (Conventional average)

$(.)'$: Root mean square

$(.)_a$: Ambient fluid

$(.)_{ij}$: Tensorial notation with summation on the repeated indices

$(.)_j$: Reference to the exit of the tube (x=0)

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