Fig. 7 presents centerline thermal profiles for multi trenches at various blowing ratios. The downstream edge of the jet interacts with the trench edge and pushes coolant toward the upstream side resulting in a larger displacement of the mainstream from the surface forming recirculation zone on the upstream edge of the trench. This recirculation zone is small or large depending on blowing ratios. At low blowing ratios, small recirculation inside the trenches prevents the mainstream to enter the trenches zone. At high blowing ratios, larger recirculation zones at upstream wide trench edge pushes the mainstream outside the trenches. It's clear that at increased blowing ratios, the jet momentum and spreading increased in three dimensions maintaining on the attachment with surface.

V. CONCLUSIONS

In this study, computational simulations were made using ANSYS CFX to predict the improvements in film cooling performance for multi trench configurations. The effects of blowing ratios on adiabatic film effectiveness are analyzed in detail. From the computational results, the following conclusions can be drawn:

- By using the multi trench configuration, the coolant jet impacted the trench wall two times allowing increasing the spreading of coolant laterally in the trench, reducing jet velocity and jet completely covered on the surface.
- No mainstream entrainment inside multi trench at M= 0.5:3.
- The results indicate that this configuration increased adiabatic with increasing blowing ratios and no observed film blow-off at all blowing ratios
- This study has shown the usefulness of CFD simulations to screen various film cooling configurations and identify promising geometries to be studied experimentally. This could greatly save manufacturing and experimentation time and cost.

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