Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

DBD Control of a Turbulent Shear Layer downstream of a Backward Facing Step[1] PATRICIA SUJAR-GARRIDO[2], NICOLAS BENARD[3], ERIC MOREAU[4], JEAN-PAUL BONNET[5], Institut Pprime CNRS University of Poitiers ENSMA — The present paper deals with the control of a free shear layer downstream of a backward-facing-step of height 3 cm at Re $3x10^4$. The initial boundary layer thickness is 1.2 cm with Re_θ 1200. The control is achieved via a single Dielectric Barrier Discharge (DBD). An optimal frequency is observed and it is shown that the plasma discharge is able to manipulate the first stages of the formation of the free shear layer and consequently to modify the flow dynamics of the entire flow; the results show some limitations of the control authority of this type of plasma discharge. Time unresolved and resolved measurements techniques are used to investigate the influence of plasma device on the global modification of mean reattachment length and on the large-scale structures and turbulent energy distribution.

[1]This work was supported by the 7th Framework Program FP7/2010-2013 MARS
[2]PhD student
[3]Assistant Professor
[4]Professor
[5]Research Director, CNRS

Jean-Paul Bonnet
Institut Pprime CNRS University of Poitiers ENSMA

Date submitted: 17 Jul 2013 Electronic form version 1.4