

## **Approximation of volumetric force distribution generated by DBD actuator**

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The spatial distributions of the time-averaged volumetric force components generated by dielectric barrier discharge actuator are approximated by simple formulas using the assumption that the volumetric force field is close to solenoidal [1]. Numerical modeling of the flow induced by DBD actuator at a given total force corresponding to experiments in [2] with the use of the proposed formulas has revealed good agreement between experimental and calculated flow fields. The proposed analytic approximation differs qualitatively from experimental force distribution in [2] and contains only 4 parameters in contrast to analytic force approximation containing much more parameters proposed in [3].

Moreover the proposed formulas have permitted to explain all qualitative features of the spatial distributions of the volumetric force components obtained by PIV-method in experiments [2]. It is shown that the basic assumptions accepted in two well-known methods of volumetric force evaluation on the base of velocity field measurements [4, 5] are unjustified. The gas pressure gradient arising in the vicinity of actuator is comparable in modulo with the volumetric force components, in contrast to the assumption taken in [4]. The absolute values of the vertical and horizontal components of the volumetric force and their spatial gradients are comparable with each other, in contrast to the assumption used in [5]. The simplifying assumptions accepted in the methods [4, 5] are physically similar. Extremal values of the seeming force components evaluated by the methods [4, 5] are underestimated. Especially it refers to the vertical force component. The seeming vertical force component evaluated by the method [4] differs both quantitatively and qualitatively from the real one. The distributions of the seeming force components calculated on the base of the proposed approximation correspond qualitatively to the experimental distributions.

### **RERERENCES**

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