

# Dielectric Barrier Discharge Plasma Actuators

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## 1 Background

Single-dielectric barrier discharge (SDBD) plasma actuators have been used effectively for flow control in a variety of applications. These range from boundary layer separation control, lift control on aerodynamic surfaces, flow vectoring, and virtual shaping of bluff bodies that are among a growing number of applications described in recent review articles(Corke et al., 2007; Moreau, 2007; Corke et al., 2009, 2010). Some of the reasons for the popularity of plasma actuators is their simplicity, high frequency response, low power consumption (2-40 Watts/ft of span for most applications(Post and Corke, 2005)), and that their effect is easily incorporated in numerical flow solvers.

The predominant SDBD configuration used for flow control consists of two electrodes, one exposed to the air and the other encapsulated by a dielectric material. The electrodes are generally arranged asymmetrically. An example configuration is shown in the top part of Figure 1.

The SDBD plasma actuator has the electrical properties of a capacitor and therefore it is powered by an AC voltage source. A large enough AC voltage causes the air over the encapsulated electrode to weakly ionize. The ionization fraction is typically less than