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Investigation of DC-Arcjets for the Ignition of Coal PowderStefan Merli¹, Reyhane Youssefi², Jörg Maier², Andreas Schulz¹, Matthias Walker¹¹IGVP, University of Stuttgart, Stuttgart, Germany ²IFK, University of Stuttgart, Stuttgart, Germany

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The growing trend of renewable sources of energy force coal-fired power section to increase the flexibility of the plants. The utilization of oil or gas as the conventional method for start up face several issues with more frequent shut down and start up. The application of arcjets is an interesting alternative for direct start up with coal. In this work dc-arcjets were investigated for their ability to ignite different types of coal under cold start-up conditions. The plasma of the arcjets was first characterized by optical emission spectroscopy and high-speed camera measurements to determine the gas temperature and dynamic behaviour of the plasma jet. Subsequently, a small lab-scale experiment with a corresponding burner geometry and a special coal particle injection was set up to study the basic interactions of the plasma with small amounts of coal particles of different types. In the next step, the arcjets were tested in a technical scale pulverized fuel combustion rig with a thermal power of up to 300 kW. The experiments were carried out for different fuel types (hard coal, lignite, biomass) at varying operating parameters such as air to fuel ratio, thermal load and arcjet lance position in order to determine the optimal conditions for ignition and maintenance of a stable flame.

Keywordsarcjet
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highspeed camera