

9th BRAZILIAN CONGRESS OF THERMAL  
ENGINEERING AND SCIENCES**Martins, Rodrigo Ferreira**  
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**Abstract.** *The reaction of iron combustion is an important chemical process in several engineering applications, yielding iron oxide and releasing energy. Such reaction is essential for the gas cutting of carbon steel plates, and can occur also in other devices where the ferrous stuff reaches high temperatures in a high oxygen concentration media. A basic aspect in such processes is to use the heat generated by the reaction to cut or heat the surface of the material. Usually, oxygen is provided as a gas, through a pre-heating flame. It was demonstrated that a micrometric droplet stream allows an excellent control of the droplet deposition over a surface. In this paper the impact of a liquid oxygen droplet jet is studied. The chemical and thermal processes that occur when the droplet jet impacts a steel flat plate are modeled and simulated, and the numerical results are compared with experimental data already available. The objective is to check if the reaction temperature rises over the iron melting temperature, determine the temperature and iron physical state during the reaction and verify if the reaction is able to sustain itself. Such knowledge would allow to estimate the possibility of the use of this process in oxi-cutting with some energy savings.*

**Keywords.** *oxi-cutting, iron combustion, liquid oxygen.*

**CIT02-0895 - NOTE ON ROTATING CUP ATOMIZERS THEORY.****Bastos-Netto, Demetrio**  
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**Abstract.** *Rotating cup atomizers, along with other rotary atomizers, are used in industrial furnaces, as they generate droplets of a nearly uniform size and process a high capability in handling large fuel flow rates. This work compares the existing droplet size distributions available in the literature and based on Tanasawa et al. fully experimental models with an extension of a theoretical model primarily developed for fan spray atomizers which has been recently improved for impinging jets and then modified to fit the behavior of Y-jet atomizers and pressure swirls atomizers. The results were found quite satisfactory for case of reasonably viscous fluids but no so for low viscosity ones the reason possibility being that Tanasawa's correlation does not contain the viscosity coefficient.*

**Keywords.** *rotation cup and disk atomizers, sprays, droplets.*