Numerical Simulation of Transport Phenomena and Chemical Processes of the MAT in a new cigarette, ACCORD

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The ACCORD cigarette is a unique, patented tobacco to produce smoke and taste by heating, rather than burning. The MAT in an ACCORD is a mixture of pectine, glycerin, tobacco particles, water and tobacco solubles. When heat-flux is applied to the MAT, it gives a mixture of gases, condensable organic components (tar), a reactive char, and ash from char oxidation. A two-dimensional model of transport phenomena and chemical processes of the MAT in the ACCORD coupled with surrounding fluid flow and the Joule heating process in the heating blades is presented. The model considers pyrolysis of MAT obeying kinetic scheme based on the functional groups (FG) and described with a single-step multi-reaction model, evaporation of water from tobacco following a mass-transfer- and rate-determined process, and the formation of carbonaceous residue. Physical processes account for convective, conductive and radiative heat transfer and velocity and pressure variations interior to the porous tobacco particle (Darcy's law). The model is implemented in CFD code, FLUENT, using user-defined-functions (UDFs).