DELTA-SHOCK WAVES AND TRANSPORT PROCESSES IN "DUSTY" MEDIA

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The presence of particles or droplets may drastically modify the flow parameters. The "dispersed phase of a substance" is usually treated mathematically as a pressureless continuum. A typical feature of dilute gas-particle flows is the formation of "bands" and "sheets" of particles. To model such media the system of zero-pressure gas dynamics with the energy conservation law is used. This system admits delta-shocks which are solution such that their components contain Dirac delta functions. We introduce integral identities to define delta-shocks and derive the corresponding Rankine-Hugoniot conditions. In contrast to the case of shock waves, a delta-shock wave front carries mass, momentum and energy. We derive the balance laws describing mass, momentum, and energy transport from the area outside the delta-shock wave front onto this front. The formation of "bands" and "sheets" is described. The Cauchy problem connected with the process of propagation of curvilinear delta-shock wave front is solved.