

Calculation of the flow through a horizontal vent located in a ceiling or floor of a multi-room compartment is considered. It is assumed that the environments of the two, vent-connected spaces near the elevation of the vent are of arbitrary relative buoyancy and cross-vent pressure difference, " Δp ". An anomaly of the standard vent flow model, which uses " Δp " to predict stable unidirectional flow according to Bernoulli's equation, is discussed.

The problem occurs in practical vent configurations of unstable hydrostatic equilibrium, where, for example, one gas overlays a relatively less-dense gas, and where " Δp " is relatively small. In such configurations the crossvent flow is not unidirectional. Also, it is not zero at " $\Delta p = 0$ ".

Previously published experimental data on a variety of related flow configurations are used to develop a completely general flow model which does not suffer from the standard model anomaly. The model developed leads to a uniformly valid algorithm, called VENTCL, for horizontal vent flow calculations suitable for general use in zonetype compartment fire models.

Based on an assumption of total consumption of inflowing oxygen, the algorithm is used in an example application where the maximum possible steady-state rate-of-burning in a ceiling-vented room is estimated as a function of room temperature and vent area.