

论文

基于信息融合的矿山电网复合保护

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摘要:

针对矿山电网, 提出一种基于工频电流与故障暂态电流信息融合的复合保护方案, 即在线路边界处并联一定通频带的带通滤波装置, 利用装置对通频带内暂态电流分量的衰减作用, 强化区内、外故障时故障暂态电流的能量差异。通过PSCAD/EMTDC仿真, 验证了带通滤波装置导致区内、外故障暂态电流分量产生明显的差异。采用参考向量法以全子集的方式对暂态电流和工频电流两种证据构建基本信任分配函数, 从而减少“折扣规则”对信息的损失, 并利用D-S证据合成理论对两种证据进行信息融合, 以基本信任分配函数的决策方法来判断区内故障。仿真计算结果表明, 这种方法不但可以准确区分区内、外故障, 同时还可以保证雷击干扰或开关操作干扰时保护不误动, 可实现井下6/10 kV配电线路的全线速动保护。

关键词: 信息融合; 矿山电网; 复合保护; 带通滤波装置; D-S证据合成理论

Research on compound protection for mine power network based on information fusion

Abstract:

A complex protection scheme for power distribution line based on information fusion of power current and fault transient current was presented. In this scheme, band pass filters were connected at boundaries of protected zones in parallel. Due to the attenuation of transient component of fault current at frequency pass-band of the device, the difference of transient current spectrum energy in the frequency band between internal faults and external faults was strengthened. The results of PSCAD / EMTDC simulation prove the obvious difference, and protection setting value can be chosen based on the results of simulation. For reducing the loss of information caused by "Discount Rule", the basic belief assignments of transient current and power current were set up by full subset reference vector method. Two evidences were fused by the D-S evidence combination theory, and a decision-making method based on the basic belief assignment was used to discriminate the internal faults. The simulation results prove that the scheme is an available mine 6/10 kV distribution line protection solution, which can not only discriminate internal faults or external faults, but also can ensure protection reliability under lightning strike or switch operating.

Keywords: information fusion; mine power network; compound protection; band pass filter; D-S evidence theory

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