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THE TERRESTRIAL TSUNAMI AND THE GREAT FLOOD

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Abstract: In this paper, we mainly discuss outburst wave forming when the dam collapses and its propagation in riverway, its transformation to flood wave and also the infection it brings to the ambience. Our most important assumption is that we simplify the natural riverway into a prism gully with rectangle section in virtue of the concept of gully from hydraulics. And then, based on Saint-Vennat equations in hydraulics, which is proper for depicting the process of unsteady flows motion, and the information we gather from Internet, we give four Saint-Vennat PDEs models, as well as theirs boundary conditions, and by numerical compute method (explicit difference method, and method of characteristics on rectangle grid), and Matlab language, we simulate the whole process including the formation, the propagation, the transformation to flood wave of the outburst wave which produced by the collapse of the Saluda Dam. The numerical solutions of the PDEs fit the hydraulics theory well. Firstly, the outburst wave we stimulate is turned out to be a 23-meter-high water wall with a speed of 5m/s or 15km/h. Like the hydraulics theory about the outburst wave, it is indeed a terrestrial tsunami. Secondly, we find that the reinjection happened in the Rawl Creek. The wave could pour back to 460m away from the interjunction in less than 3 minutes with a 0.05 radian adverse slope, where is the limitation that the energy conservation law allows the water could go. Thirdly, the simulation of the transformation from outburst wave to flood wave exactly meets hydraulics theory. And the flood, which still has the wave crest over 18m high, could overflow an estimated 3,450,000 water into Columbia city in about 13 hours, and for the distance between the riverside to the capitol building is only 654m, we hold the opinion that the foot of the hill is indubitable trapped in water. Thanks to the location this building stands, it can fortunately escape from the danger while the buildings in plain are not that lucky. The advantages of the PDEs model is simulating through laws of physics, hence has an impersonal sequence. The convenience of obtaining and altering initial parameters, the quickness of getting consequences under the help of program are excellent. However, model sometimes seems much too idealistic, theres definitely a difference between the model and the practical situation.

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