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Tsunami generation process from the great Sumatra-Andaman earthquake of 26 December 2004

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The tsunami from the Mw9.0 earthquake off Sumatra Island of 26 December 2004 devastatingly affected many countries around the Indian Ocean, including Indonesia, Thailand, Myanmar, Sri Lanka, Maldives, and India. It is reported that some evidences of such megathrust recurrent earthquakes (>M9) have been also found in the tsunami deposits and the plants along the coast around the Pacific Ocean (e.g., Nanayama et al., 2003; Cisternas et al., 2005). To mitigate future tsunami disasters caused by such M9 class earthquakes, i.e., more than 1,000 km long seismic fault source, we should deepen our understanding of the tsunami generation process of the recent Sumatra event. More realistic tsunami modelling needs to be performed to achieve this goal. Therefore, we try to carry out three different numerical modelling of the tsunami generation followed by the propagation based on Ohmachi et al. (2001); the first one is a realistic modelling that takes both the fault rupturing process and the dynamic contribution of the seabed into account (referred to as model A), the second one is a simplified modelling that includes only the dynamic contribution of the seabed (model B), and the third one is a static modelling, i.e., a traditional procedure to generate tsunami (model C). The initial condition is dynamically given into the water layer to reproduce tsunami in the model A and B. In the model B, a ramp time function that is equivalent to the total duration time of the earthquake is used as a rise time. On the other hand, only static deformaion is gieven at the seasurface in the model C. The seismic fault model used in all of our tsunami modelling has 900 km x 200 km with its maximum slip of 8.9 m proposed by Yamanaka (2005). Total duration time of the seismic faulting is estimated to be about 400 s with three major asperities. We first synthesize the dynamic motion in addition to the static deformation of the seabed from the fault model, and then they are used in the three kinds of tsunami modelling mentioned above. The initial condition based on the traditional technique is appropriate, because the differ-

ence between the model B and C is found only in the tsunami arrival time. As a result, the fault rupturing begins at the southern part of the fault and propagates northward. Hence, the tsunami arrival time at the southern coastal region, e.g., the western coast of Sumatra Island, in the model A is earlier than that in other two models. Thus, the fault rupturing at least needs be considered in any tsunami modelling. The result presented here is integrated in the Japan Society of Civil Engineering (JSCE) Tsunami Committee, and it is to be used as the tsunami initial condition followed by the propagation for the coastal region calculations around the Indian Ocean.