

*Citation:*

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The two intermediate integrals become

$$qe^U - \int e^U \frac{\partial U}{\partial y} dz + \int W(xy) dx = f(y),$$

$$pe^U - \int e^U \frac{\partial U}{\partial x} dz + \int W(xy) dy = f(x).$$

VI.  $t - \dot{\lambda} = 0$ .

In this case the only condition is that  $\lambda$  is independent of  $p$ . The intermediate integrals are found by uniting the three integrals  $u, v, w$  of

$$\frac{dx}{0} = \frac{dy}{1} = \frac{dz}{q} = \frac{dq}{\lambda(x,y,z,q)}$$

to

$$u = f(v),$$

$$u = f(w).$$

*Remark.* It seems that the form sub I may still be chosen more generally.

**Physical Geography.** — “*Two earth-quakes, registered in Europe and at Batavia*”. By Dr. J. P. VAN DER STOK.

A. 1. In the night of 29 to 30 September 1899, a heavy earthquake caused serious damage at the south coast of the isle of Ceram and in the Mollucco's.

The first official report, sent by the Resident of Amboina to the Governor-General immediately after the disaster, runs as follows:

„In the night of 29 to 30 September at 1<sup>h</sup> 45<sup>m</sup> a. m. a heavy earthquake, followed by a series of sea-waves, caused considerable damage at the south coast of Ceram and, in a less degree, also at the isles of Ambon, Banda and the Ulias-isles. Several villages at Ceram's south coast have been devastated; in the Elpaputih-Bay all except two. The prison at Amahei has been completely destroyed, the fortifications partially, whereas the presbytery and the churches remained unhurt, as also the garrison and the civil officers at Amahei and Kairatoe.

As the Government-steamer Arend proved incapable of doing all the work, the steamers Gouverneur-Generaal's Jacob and Japara of the Royal Pakketvaart-Company were chartered in order to convey victuals and medical assistance and for the transport of the wounded, whilst also the Resident of Ternate was requested to give assistance.

Provisions and material for building are to be had at Amboin in sufficient quantities and have been provided immediately; but in other respects there is still much sufferance.

The steamer 's Jacob brought over to Amboina 27 wounded, whilst the Japara, by which boat the Resident and first medical officer went to the place of the disaster, conveyed 49 wounded from Amahei and Saparua.

From Banda, where the pier before fort Nassau has been destroyed, satisfactory information has been received.

According to preliminary reports the number of natives, killed by the disaster, amounts to 4000 and that of the wounded to 500.

The natives who survived have fled to the inland country and do not venture to come back to their hamlets: there is much agitation everywhere, where the effect of the earth- and seawaves has been felt. The petroleum-establishment at Bulobay has not suffered any damage."

2. The seismograms, received from Dr. FIGEE, show that this earth-quake has been registered very neatly at the Royal Observatory at Batavia.

As far as I know this is the first case that an earth-quake, originating in the Molucco's has been observed at Batavia by means of Milne's seismograph. The motion commences abruptly at 0<sup>h</sup> 14<sup>m</sup>,6 Batavia time, which corresponds to 1<sup>h</sup> 43<sup>m</sup>,3 local time, the difference in longitude between Amahei and Batavia being 1<sup>h</sup> 28<sup>m</sup>,7.

3. On the 29<sup>th</sup> of September an earth-quake has been also registered in the new Imperial Central-station for seismology at Strassburg by the Rebeur-Ehlert pendulums and also at Dr. SCHÜTT's seismic Institute at Hamburg.

Professor GERLAND at Strassburg has kindly forwarded the following dates, reduced to Greenwich time.

	Strassburg.	Batavia.
Beginning (about)	17 <sup>h</sup> 23,5 <sup>m</sup>	17 <sup>h</sup> 7,6 <sup>m</sup>
Maximum	17 <sup>h</sup> 58,8 <sup>m</sup>	17 <sup>h</sup> 29,6 <sup>m</sup>
End (about)	18 <sup>h</sup> 49,4 <sup>m</sup>	18 <sup>h</sup> 23,0 <sup>m</sup>
Duration	1 <sup>h</sup> 25,9 <sup>m</sup>	1 <sup>h</sup> 15,4 <sup>m</sup>

As the seismograms bear an entirely different character as the waves proceed from the centrum of disturbance, an exact comparison of the epochs of commencement, maximum effect and end offer, up to the present time, considerable difficulties.

Moreover in most cases the epochs of beginning and termination cannot be sharply indicated, as the seismograms generally exhibit a gradual increase and decrease of motion. An exact measurement of the velocities of propagation will be possible only when a reliable method has been found of analysing the compound movement in its elementary constituents.

With the hypothesis, that the vibrations have travelled along paths approximating the chords through the earth, we find that the velocity of propagation has been about 10 K.M. per second; the distance between Strassburg and Amahei being 10402 K.M.

As the distance between Batavia and Amahei is 656 K.M., the exact local time of the earth-quake can be fixed at 1<sup>h</sup> 42<sup>m</sup>,2.

B. Concerning the other earth-quake, observed also at Batavia as well as at Strassburg, the following data are provided by the seismograms:

		<i>Strassburg.</i>	<i>Batavia.</i>
September 10	preliminary tremors	20 <sup>h</sup> 58, <sup>m</sup> <sub>9</sub> beginning.	
		21 <sup>h</sup> 8, <sup>m</sup> <sub>2</sub> maximum.	
1899.	Greenwich time	21 <sup>h</sup> 54, <sup>m</sup> <sub>3</sub> beginning.	22 <sup>h</sup> 7, <sup>m</sup> <sub>0</sub>
		21 <sup>h</sup> 58, <sup>m</sup> <sub>9</sub> maximum	22 <sup>h</sup> 54, <sup>m</sup> <sub>5</sub>
		24 <sup>h</sup> 28, <sup>m</sup> <sub>9</sub> end	23 <sup>h</sup> 19, <sup>m</sup> <sub>5</sub>
		Duration 2 <sup>h</sup> 34, <sup>m</sup> <sub>6</sub>	1 <sup>h</sup> 12, <sup>m</sup> <sub>5</sub>

From these records we may conclude that the centre of the disturbance is situated at a greater distance from Batavia than from Strassburg; firstly because preliminary tremors have been registered at the latter place about 21<sup>h</sup>; secondly because the epoch of maximum disturbance at Batavia is about one hour later than at Strassburg, and thirdly because the duration is considerable less at the former than at the latter station.

The last argument is, however, questionable, owing to the difficulty of fixing the characterizing epochs. In „Nature“ it is noted down, (presumably by Prof. MILNE from the isle of Wight) that seismic disturbances occurred on the 3<sup>rd</sup>, 10<sup>th</sup> and 17<sup>th</sup> of September.

No indications of the exact time of occurrence are given, but it is stated that the centre of disturbance is in Alaska.

