

## **Sediment transport in the area of the Sopot pier**

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Coastal sediment transport is a natural process that appears when energy of waves is sufficient for moving solid particles from the bottom. Sediment transport rate depends on the median diameter of local sand and it is compatible with the direction of wave propagation.

Also it is natural, that any protruded from the beach construction disturbs continuity of beach transport caused by waves. The Sopot pier has been built over 100 years ago and it is the longest wooden pier on the Baltic Sea coast, it is about half kilometre long. The pier is located at the end of the Monte Casino street and it is one of the biggest attractions of the city as well as in the country.

In the past and now we have observed the disturbed sediment transport in the area of the Sopot pier. But during recent years, this process has gained greater momentum. The beach at the Sopot pier has been growing by several meters. All indicates that the cause of the observed phenomenon is the marina. The marina structure which is in some distance from the shore, has been acting as a powerful, emerged breakwater boundary.

As a tool the sediment transport model was implemented for Sopot pier area. The implemented numerical forecasting sediment transport model in the area of the Sopot pier reflects well the deposit growth rate for the archived data from 2010 to 2015. On the basis of differences in bathymetry data provided by the Maritime office and the analysis the model results the average deposits in accumulation in the pier area was determined to be about 16,000 m<sup>3</sup> / year for the assumed area of analysis, the model have shown similar result. The analysis suggests that strong winds generating significant waves as well as meaningful sediment transport dominate in the autumn and winter. You cannot, however, rule out strong waves in summer. Under moderate waves the sediment transport is insignificant. The most intense movement of the sediment is observed in the vicinity of the shoreline, it disappears with distance from the shoreline. Numerical sediment transport model DHI MIKE also shows that the Sopot marina generates a 'shadow' of waves. The shadow causes a disturbance in the continuity of natural sediment transport along the beach, the consequence of which is the creation of the sand shapes at the bottom in the form of convexity of coastline known as a spit. The model results also shows that 80% of the accumulated sand near the pier come from local beaches south-east of the pier. The remaining 20% was transported from the north-west. The direction of sediment transport corresponds to the directions of local waves